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CAREERS 4.0

Career Competencies 4.0 Framework Report

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Introduction

The accelerating digitization and automation of work, known as the fourth industrial revolution (or Industry 4.0), will have an enormous impact on individuals' career experiences. It is considered to be the most important societal and economic trend that will fundamentally change the nature of work, business, and society in the coming decades.

Industry 4.0 combines multiple technologies, connecting the physical, digital and biological "worlds" and leading to unprecedented transformations of the economy, business, society and the individual. Digitalisation, climate change, green growth and other mega trends are changing business models and information structures that will have disruptive effects on European labour markets, as well as on the VET and career guidance provision. These changes might lead to the elimination of thousands of jobs and the disappearance or fundamental change of many current occupations. At the same time, new occupations, new industries,and fundamentally new ways of work will likely emerge. It seems clear that digitization and automation might thus be one ofthe most important issues to shape the future nature of career choices, career development, and career counselling.

The Careers 4.0 project seeks to **enable career guidance and planning in the digitization era, preparing education and career professionals** as well as the end users to be able to cope with the management of change, the achievement of career adaptability and resilience and lifelong career development within the disruptive changes and transitions in the world of education and work, in the digital transformation era. The overall purpose of the project will be achieved through the development of tailor-made career guidance material, training and information resources, to serve as capacity building tools for first line professionals to help diverse clients with multiple job transitions to new jobs and new forms of work available (e.g. teleworking, platform economy, crowd work) and will feature new, emerging and flexible career pathways, enabled by automation, digitalisation, green transition etc. in different sectors and occupations, enhancing the inclusiveness of VET,work environments and diversity of the workforce.

The Careers 4.0 project attempts to re-establish the most frequently used Holland's RIASEC model, featuring the combination of personality interest and work environment as career predictors in the future labour market and to propose new tools and career resources for VET and career support professionals, that aremore suitable to address lifelong career development of the individuals in transitional, digitalised and precarious workingconditions. This approach is documented to promote the development of quality career guidance, VET and employment services, broadening the career aspirations and employability of young people towards more future oriented career choices(Cedefop et al., 2021; Cedefop, 2019; Barnes et. al., 2020; Hirschi,2017).

It has been recognized for years that concerns regarding career issues are common and at the same time varied among countries worldwide, which requires enhanced synergies (UNESCO, 2002). The increasing international challenges highlight the need to prepare adequate means and resources for career counselling, as well as better equipped professionals. At European level, career guidance provision is a shared policy responsibility in the fields of education,training, youth, employment and social affairs (IAEVG, 2009; Barnes et al., 2020). In this context, career guidance is directly connected to European initiatives to connect education & training with the labour market, contributing to the improvement of VET systems efficiency to update citizens' skills and facilitate the transparency and recognition of qualifications, as well as educational and professional mobility. It is also considered a necessary service to address issues such as early school leaving and the social and professional inclusion of vulnerable social groups (NEETs, disabled people, migrants, refugees,etc.) (Cedefop, 2011; Cedefop, 2014; Cedefop, 2015; IAEVG, 2017; IAEVG, 2015; IAEVG, 2019; Hooley, 2014; Barnes, et.al., 2020).

In this respect, the adaptation of career guidance practices to globalized changing labour market needs isnecessary to be approached through larger scale synergies and cross-country cooperation. Structured transnational partnerships will help to develop better, more effective and transferable practices and tools to tackle common needs.Engaging different organizations active in the field of education, VET, career guidance at national, local and regional level in the partner countries will give the opportunity to share knowledge and effective practices and deliver beneficial results for all partner countries as well as facilitate the adaptability, reusability and wide dissemination of project results among the different countries and at European level as well.

Therefore, withing the Erasmus+ project "Careers4.0" we created a **career competencies 4.0 framework that aims to address the ongoing structural changes in the global labour market,** helping individuals navigate their career choices in the rapidly evolving landscape. As it is already mentioned, the development of the Framework is driven by the need to map both hard and soft skills essential for success in today's job market. Drawing from international classifications such as ESCO, OECD PIAAC, and the EU Key Competencies Framework, this framework seeks to establish a common language around future-oriented skills and competencies.
The framework caters to a wide range of beneficiaries, including young high school graduates, low-skilled youth, and individuals with CES (Continuing Education and Skills). By providing a set of business-oriented core skills, the framework aims to empower individuals to align their career aspirations with the demands of the industry.
The Career Competencies 4.0 Framework serves as an invaluable tool for various purposes. Firstly, it assists individuals in understanding and developing essential hard and soft skills necessary for success in the globalized labour market. Secondly, career counsellors can utilize the framework to gain insights

into the definitions and outcomes of each competency, facilitating more effective guidance for their clients. The competencies outlined in the framework are not fixed traits but can be learned and developed over time. They represent a combination of both technical expertise and interpersonal skills that are crucial for career advancement. Additionally, we need to point out that the 18 skills that are included are not all demanded in all jobs. Some skills are important in a specific set of job areas and others in others, or in lower or higher level.

Furthermore, this framework **emphasizes the learnability** of the identified competencies. It acknowledges that these skills can be developed and honed through education, training, and real-world experience. Therefore, it empowers individuals with the knowledge that they can improve and adapt to meet the demands of the ever-changing job market.

However, it's essential to note that the **Career Competencies 4.0 Framework is only informative** and will not function as a standalone tool. Instead, it will serve as the **foundation for an assessment tool** that enables users to understand their proficiency levels in the mentioned competencies and identify suitable job matches. The skills assessment tool that will be created based on the framework, will enable counsellors to assess their clients' skill levels and provide tailored guidance on career paths and development, while end users can gauge their proficiency in each competency and identify suitable career paths based on their strengths and areas for improvement. Together, the framework and assessment tool offer a comprehensive approach to career development in today's dynamic job market opportunities.

Universal Skills for labour market integration – Definitions and Frameworks

Skills are recognised as extremely important in the modern economy and in everyday life, especially within the on-going structural changes in the global labour market and rapid technological change, as well as demographic changes, with ageing populations, and workforce's migration. At the same time, the supply of skills often struggles to match these rapidly evolving demands. In this respect, special emphasis is placed at European and international level on skills related to labour market participation, employability skills and life skills, while there are different perceptions and approaches to the definition and assessment of 'skills'.

Skills, in general, are a "set of inborn and acquired personal characteristics, attitudes, knowledge and skills leading to high-quality performance" (European Commission, 2007). They are also defined as the combination of knowledge and experience required to achieve a particular physical or mental work and refer to the ability to perform a task (the ability to do something good). According to European Qualifications Framework (EQF) definition "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)" (European Commission, 2017). The term "skill" refers typically to the use of methods or instruments in a particular setting and in relation to defined tasks. The term "competence" is broader and is more than just knowledge and skills. It refers typically to the ability of a person - facing new situations and unforeseen challenges - to use and apply knowledge and skills in an independent and self-directed way to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context (OECD, 2005, ESCO Handbook, 2019). Competency is described also as the ability to perform particular tasks and duties to the standard of performance expected in the workplace, applying all relevant skills, knowledge and attitudes consistently over time in the required workplace situations. Competencies may be gained in a number of ways including through formal or informal education and training, experiences in the workplace, general life experience and/or any combination of the above ILO (2015).

Skills are distinguished in generic skills, used in a variety of occupations and professional skills related to a specific profession. According to CEDEFOP's Skills Panorama glossary[1]:

- **Basic skills** are those needed to live in contemporary society, e.g. listening, speaking, reading, writing and mathematics.
- **Hard skills** are strictly job-specific, closely connected with knowledge, easily observed, measured and trained. They constitute the core occupational requirements of a job.
- **Soft skills** are non-job specific, are cross-cutting across jobs and sectors,

[1] https://skillspanorama.cedefop.europa.eu/en/glossary

closely connected with intangible personal attitudes and competences (confidence, discipline, self-management) and social competences (teamwork, communication, emotional intelligence). This makes them more difficult to be quantified and developed.

- **Transversal or "transferable" skills** are skills individuals have which are relevant to jobs and occupations other than the ones they currently have or have recently had. They may also have been acquired outside the work environment or through recreational activities or participation in education and training programs. In general, these are skills acquired in a specific context or in order to address a particular situation / problem and they can be transposed in a different context.

At European but also international level there are different perceptions and approaches to the definition of 'soft skills'. Soft skillsare considered as equally important to hard skills when looking for a job, while they are more difficult to be demonstrated and measured and employers cannot easily identify them. Soft or transferable skills mostly refer to flexibility and adaptability, interpersonal and communication skills, problem solving, creativeness, team working skills, initiative, leadership, creativity, self-motivation, time management and the ability to make decisions. Personal skills and attitudes are as important to employers as their vocational counterparts and are considered necessary in different work settings and important in order to achieve employability and active participation in the labour market as well as the effective management of personal and social life (life skills) (Brewer, ILO 2013, Cedefop, 2013). Due to labour market instability, predicting the hard skills to be needed in the future becomes even more difficult, so it is consequently obvious that soft skills should be given more emphasis. Soft outcomes may include achievements relating to:

- interpersonal skills, for example: social skills and coping with authority
- organisational skills, such as: personal organisation, and the ability to order and prioritise
- analytical skills, such as: the ability to exercise judgement, managing time or problem solving, and
- personal skills, for example: insight, motivation, confidence, reliability and health awareness.

Dewson S. et al. (2000).

In most OECD countries, value is placed on flexibility, entrepreneurship and personal responsibility, while individuals are expected to be adaptive, but also innovative, creative, self-directed and self-motivated. In today's complex reality, people need to develop abilities to tackle complex mental tasks, going well beyond the basic reproduction of accumulated knowledge. In this respect, key competencies involve a mobilisation of cognitive and practical skills, creative abilities and other psychosocial resources such as attitudes, motivation and values (OECD, 2005).

The International Labour Organization (ILO) has put central focus on **core competencies**, defined as the collection of skills, knowledge and attitudes that is needed for all workplaces to operate effectively, stressing that a low-skill, low-productivity, low-wage economy is unsustainable in the long term and is incompatible with poverty reduction. Core competencies, also known as key competencies, essential skills, transferable competencies, employability skills, core skills or soft skills, are in high demand in workplaces worldwide, as industry adapts to the changes brought about by globalization, increased competition and international mobility. It has been identified that the development of core skills – including **literacy, numeracy, communication skills, teamwork, problem-solving, interpersonal communication skills, working in teams, negotiation skills, problem solving, and enterprise skills** and other relevant skills – and learning ability – as well as awareness of workers' rights and an understanding of entrepreneurship, are capabilities that are important for success in employment and in life as well as the building blocks for lifelong learning and capability to adapt to change. Core employability skills build on and strengthen skills developed through basic and technical education. They are transferable, that is they can be used in other contexts or jobs, are required to perform all kinds of tasks, at various levels, depending on the task and they are developed over a lifetime. They enable individuals to constantly acquire and apply new knowledge and skills and are, therefore, critical to lifelong learning. Acquiring the technical skills needed to perform specific duties, and professional /personal attributes such as honestly, reliability, punctuality, attendance and loyalty are increasingly highprized and sought by employers. Core competencies enable an individual's potential in all aspects of life, while workers equipped with these skills can be able to adjust more quickly to technological change and organizational restructuring, as well as to be more resilient and find decent employment in times of economic shocks and crisis. In addition, the portability of skills, which is based firstly on core skills, enables workers to apply knowledge and experience to new occupations or industries and secondly on systems that codify, standardize, assess and certify skills so that levels of competence can be easily recognized by social partners in different labour sectors across national, regional or international labour markets. Despite the differences in terminology in different countries, all employability skills share some common elements:

- basic/fundamental skills such as literacy, using numbers, and technology;
- conceptual/thinking skills such as collecting and organising information, problem-solving;
- learning-to-learn skills such as thinking innovatively and creatively, systems thinking; and
- people-related skills such as communication and teamwork skills.

To be considered "core" the competencies have to:

- be able to be learned and be assessable;
- be essential to preparation for employment;
- be core to the kinds of work and work organization in a range of entry level occupations, rather than being occupation-or industry-specific;

- equip individuals to participate effectively in a wide range of social settings, including workplaces and adult life more generally; and
- involve the application of knowledge and skills.

(ILO, 2008, 2015).

Several existing **competence frameworks at European and international level** define knowledge, skills and attitudes as key elements of a competence, while they go beyond cognitive skills and emphasise certain non-cognitive skills, attitudes or values. Competencies such as **adapting to change**, **dealing with complexity** and **responding to fast changing digital and technological environments** are included in all competence frameworks. Also, the so-called transversal skills, such as **critical thinking, creativity and problem solving**, are featured prominently in all competence frameworks (European Commission, 2018).

The most known competence frameworks are described below.

OECD DeSeCo- Definition and Selection of Competencies (2005)

The OECD DeSeCo - Definition and Selection of Competencies (2005)[2]provides a conceptual framework for key competencies, classifying them in three broad categories: 1. Using Tools Interactively, 2. Interacting in Heterogeneous Groups, and 3. Acting Autonomously. These categories are interrelated, and collectively form a basis for identifying and mapping key competencies.

Table 1: DeSeCo conceptual framework for key competencies

1:Using Tools Interactively	*The social and professional demands of the global economy and the information society require mastery of socio-cultural tools for interacting with knowledge, such as language, information, and knowledge, as well as physical tools such as computers.*	A. **Use language, symbols and texts interactively** B.**Use knowledge and information interactively** C.**Use technology interactively**
2: Interacting in Heterogeneous Groups	*As societies become in some ways more fragmented and also more diverse, it becomes important to manage interpersonal relationships well both for the benefit of individuals and to build new forms of cooperation.*	A. **Relate well to others** B. **Co-operate, work in teams** C.**Manage and resolve conflicts**
3:Acting Autonomously	*Individuals must act autonomously in order to participate effectively in the development of society and to function well in different spheres of life including the workplace, family life and social life.*	A. **Act within the big picture.** B. **Form and conduct life plans and personal projects.** C. **Defend and assert rights, interests, limits and needs.**

Source: OECD, 2005.

It is acknowledged that individuals need to be able to use a wide range of tools for interacting effectively with the environment: both physical ones such as information technology and socio-cultural ones such as the use of language. They need to understand such tools well enough to adapt them for their own purposes – to use tools interactively. Second, in an increasingly interdependent world, individuals need to be able to engage with others, and since they will encounter people from a range of backgrounds, it is important that they are able to interact in heterogeneous groups. Third, individuals need to be able to take responsibility for managing their own lives, situate their lives in the broader social context and act autonomously. Reflectiveness, as well as the ability to deal with differences and contradictions in diversity and universality,is an underlying part of this framework.Thus, reflectiveness implies the use of metacognitive skills (thinking about thinking), creativeabilities and taking a critical stance (OECD, 2005).

OECD Competency Framework (2014)

[2]https://www.oecd.org/pisa/35070367.pdf

The OECD Competency Framework (2014) differentiatesTechnical Competencies - which are usually required to perform a given job within a job family - form Core Competencies, which summarise the capabilities that are important across all jobs. The OECD Competency Framework displays **15 Core Competencies** grouped into three clusters:

- The blue clustergroups the delivery-related competencies.
- The purple groups interpersonal competencies.
- The green cluster relates to strategic competencies.

Figure1: OECD Competency Framework

Source: OECD, 2014.

OECD PISA Global Competency Framework

The **OECD PISA Global Competency Framework**(2018)[3] defines **global competence** as "a multidimensional capacity", enabling globally competent individuals to examine local, global and intercultural issues, understand and appreciate different perspectives and world views, interact successfully and respectfully with others, and take responsible action toward sustainability and collective well-being. Key skills include **analytical and critical thinking, ability to interact respectfully, empathy and flexibility**, as well as attitudes, such as **openness, respect for cultural otherness, global mindedness** and **responsibility**. Global competence can boost employability, while effective communication andappropriate behaviour within diverse teams, be open to peoplefrom different cultural backgrounds, build trustin diverse teams and demonstrate respect forothers arekeys to success in many jobs in a globalised world. The framework outlines **four target dimensions of global competence** that people need to apply successfully in their everyday life:

1. the capacity to examine issues and situations of local, global and cultural significance (e.g. poverty, economic interdependence, migration, inequality, environmental risks, conflicts, cultural differences and stereotypes);
2. the capacity to understand and appreciate different perspectives and world views;
3. the ability to establish positive interactions with people of different national, ethnic, religious, social or cultural backgrounds or gender; and
4. the capacity and disposition to take constructive action toward sustainable development and collective well-being.

PISA 2018 initiated the assessment of 'global competence' aiming to add the construct to literacy, mathematical and science competences.

Figure 3: The dimensions of Global Competence

Source: OECD, 2018

[3]PREPARING OUR YOUTH FOR AN INCLUSIVE AND SUSTAINABLE WORLD - The OECD PISA global competence frameworkhttps://www.oecd.org/pisa/Handbook-PISA-2018-Global-Competence.pdf

ILO Regional Model Competency Standards (RMCS)

According to the ILO Survey of employers on skills and competitiveness in 2014, employers report that, rather than apply cost-cutting measures to enhance productivity, they are more likely to invest in programmes to build capacity around management and leadership skills (ILO, 2014c). These types of skills are parts of core competencies, reflecting the needs and cruciality of the recognition and reference for core competencies in this region. To help accelerate the improvement of training systems and the mutual recognition of skills (MRS), the ILO has, the Regional Model Competency Standards (RMCS).The **ILO Regional Model Competency Standards (RMCS) for Core Competencies,** developedin consultation with ASEAN employers, governments and workers,defines a general framework that can be used by all enterprises and individuals, regardless of location or business size, including the following core units of competency:

Table 2: Core and green competencies

Functional area		Code	Unit title
A	Core competencies	CC-A1	Maintain professionalism in the workplace
		CC-A2	Receive and respond to workplace communication
		CC-A3	Communicate effectively with team members and customers
		CC-A4	Apply workplace safety practices and procedures
		CC-A5	Work sustainably and effectively
		CC-A6	Manage personal finances
		CC-A7	Address workplace harassment
B	Core competencies	CC-B1	Maintain professional development and career professionalism
		CC-B2	Lead workplace communication
		CC-B3	Prepare and report workplace information
		CC-B4	Lead small teams
		CC-B5	Prepare and implement negotiation
		CC-B6	Solve problems related to work activities
		CC-B7	Work sustainably and effectively
		CC-B8	Train or mentor others on a one-to-one basis
		CC-B9	Apply environmental principles and advocate awareness
C	Core competencies	CC-C1	Use special communication and management skills
		CC-C2	Develop teams and individuals
		CC-C3	Apply problem solving techniques in the workplace using critical thinking
		CC-C4	Plan and organize the work
		CC-C5	Manage own performance and workload
		CC-C6	Promote environmental management and safeguard environmental assets
		CC-C7	Assess and manage workplace health and safety

(Source: ILO, 2015).

ILO core skills for employability

ILO, following a review of the numerous lists of skills and abilities developed by countries, agencies and researchers, has mapped the **core skills for employability**that individuals need to be successful in attaining, retaining and advancing in employment, in today's world characterized by high unemployment and underemployment, lower quality jobs, difficult transitions into decent work but also skills shortage. **Core work skills** include the ability to learn and adapt; read, write and compute competently; listen and communicate effectively; think creatively; solve problems independently; manage oneself at work; interact with co-workers; work in teams or groups; handle basic technology, lead effectively as well as follow supervision. The core employability skills from the various matrices have been pooled under four broad skill categories: learning to learn; communication; teamwork; problem-solving (see Table: Core skills for employability) (Brewer, ILO, 2013).

Table 3: Core skills for employability

Broad skill category	Core work skills/abilities
Learning to learn	• think abstractly • use learning techniques to acquire and apply new knowledge and skills • organize, process, and maintain information • interpret and communicate information • pursue independent learning • conduct systematic inquiry; and follow through to find answers • take responsibility for own learning • spend time effectively • stay on task • select the best approach for tasks • begin, follow through and complete tasks • manage own learning • adaptable • works safely • is willing to learn • uses time efficiently without sacrificing quality
Communication	• competent in reading • write to the needs of an audience • write effectively in the languages in which the business is conducted • listen and communicate effectively • listen to understand and learn • read independently • read, comprehend and use materials, including graphs, charts, displays • understand and speak the language which the business is conducted • use numeracy effectively • articulate own ideas and vision
Team work	• interact with co-workers • understand and contribute to the organization's goals • work within the culture of the group • plan and make decisions with others and support the outcomes • work in teams or groups • respect the thoughts and opinions of others in the group • coach, mentor and give feedback • lead effectively • lead when appropriate • mobilize a group for high performance • manage oneself at work • accountability for actions taken • build partnerships and coordinate a variety of experiences • work toward group consensus in decision-making • value others' input • accept feedback • resolve conflicts
Problem-solving	• think creatively • solve problems independently • test assumptions • identify problems • take the context of data and circumstances into account • adapt to new circumstances • ability to identify and suggest new ideas to get the job done (initiative) • collect, analyse and organize information (planning and organization) • ability to plan and manage time, money and other resources to achieve goals

Source: Brewer, ILO, 2013.

European Reference Framework for Key Competences for Lifelong Learning (2006)

The **European Reference Framework for Key Competences for Lifelong Learning** (2006) defined eight key competences necessary for personal fulfilment, active citizenship, social cohesion and employability in a knowledge society, as following: 1. Communication in the mother tongue, 2. Communication in foreign languages, 3. Mathematical competence and basic competencies in science and technology, 4. Digital competence, 5. Learning to learn, 6. Social and civic competence, 7. Sense of initiative and entrepreneurship, 8. Cultural awareness and expression. The 2006 Reference Framework stressed that key competences are all considered equally important, because each of them can contribute to a successful life in a knowledge society. Many of the competences overlap and interlock that is aspects essential to one domain will support competence in another. Competence in the fundamental basic skills of language, literacy, numeracy and in information and communication technologies (ICT) is an essential foundation for learning, and learning to learn supports all learning activities. There are a number of themes that are applied throughout the Reference Framework, such as critical thinking, creativity, initiative, problem solving, risk assessment, decision taking, and constructive management of feelings, which play a role in all eight key competences (European Commission, 2006). In January 2018, following a consultation process on the Review of the 2006 Key Competences Framework started in June 2016 until June 2017, the Commission adopted the proposal for a new Recommendation on Key Competences for Lifelong learning[4]. In the new 2018 Recommendation competences are defined as a combination of knowledge, skills and attitudes, where:

a) Knowledge is composed of the facts and figures, concepts, ideas and theories which are already established and support the understanding of a certain area or subject;

b) Skills are defined as the ability and capacity to carry out processes and use the existing knowledge to achieve results;

c) Attitudes describe the disposition and mind-sets to act or react to ideas, persons or situations.

Key competences are those which all individuals need for personal fulfilment and development, employability, social inclusion, sustainable lifestyle, successful life in peaceful societies, health-conscious life management and active citizenship. They are developed in a lifelong learning perspective, from early childhood throughout adult life, and through formal, non-formal and informal learning in all contexts, including family, school, workplace, neighbourhood and other communities. Competences can be applied in many different contexts and in a variety of combinations. Skills such as critical thinking, problem solving, team work, communication and negotiation skills, analytical skills, creativity, and intercultural skills are embedded throughout the key competences. The **2018 Reference Framework** sets out eight key competences:

1. Literacy competence

[4] https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

2. Multilingual competence
3. Mathematical competence and competence in science, technology and engineering (STEM)
4. Digital competence
5. Personal, social and learning to learn competence
6. Citizenship competence,
7. Entrepreneurship competence
8. Cultural awareness and expression competence

The framework defines the essential knowledge, skills and attitudes related to each of these competences, and encourages the assessment and validation of competence development available to everyone, and especially to low skilled individuals, enabling different approaches and including related activities of employers, guidance practitioners and social partners (European Commission, 2018).

Figure 4: Key competences that are crucial to better prepare people for today's societies

Source: Factsheet on Key competences for lifelong learning, European Commission, 2017.

European Skills, Competences, Qualifications and Occupations (ESCO)

The **multilingual classification of European Skills, Competences, Qualifications and Occupations (ESCO)**, part of the Europe 2020 strategy, identifies and categorizes skills, competences, qualifications and occupations relevant for the EU labour market and education and training. The occupations pillar aims to describe all occupations relevant for the European labour market, featuring 2.942 occupations in ESCO v1. The knowledge, skills and competences pillar, also referred to as the "skills pillar", provides a comprehensive list of skills that are relevant for the European labour market. ESCO v1 contains 13 485 skills. ESCO skills pillars contain language and digital competences as well as transversal knowledge, skills and competences, which are relevant to a broad range of occupations and economic sectors. They are often referred to as core, basic or soft skills and are the cornerstone for the personal development of a person. **The transversal skills and competences** are organized and described as following[5]:

- **Application of knowledge**: General aspects of specialist skills which are commonly used in the workplace and in learning, e.g. ICT, Mathematics; also refers to knowledge of the organisation and the working environment.
- **Attitudes and values:**Individual work styles, preferences and work-related beliefs that underpin behaviour so that knowledge and skills are applied effectively.
- **Social interaction:** Ability to engage effectively and in a goal-directed manner with other people encountered at work or study, e.g. with colleagues, peers, customers, clients and patients.
- **Thinking:** Ability to apply mental processes to solve complex problems and achieve goals, to acquire knowledge and to perform complex tasks.

ESCO is a valuable framework for competence assessment. The skills and competences provided by ESCO facilitate the description of existing capabilities and the identification of missing skills, including transversal skills. Coupled with proficiency levels, applications using ESCO allow individuals to assess their skills and identify those that need improvement. It also enables matching skill profiles to learning opportunities. Based on their skill profiles, users can identify their skill gaps in relation to their desired job and select learning opportunities that will address them. 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. Recruiters can use ESCO to specify the knowledge, skills and competences they expect from a successful candidate. Information on both the candidate and the expectations of the employer can be compared in job matching algorithms. As a result, people can find the job that best matches their skills and employers can find the talent they need.Information and data in ESCO is based on an original work published by the ILO under the title International Standard Classification of Occupations, ISCO-08. (ESCO Handbook, 2019).

[5]Source: https://ec.europa.eu/esco/portal/skill

European Digital Competence Framework for Citizens (DigComp)

The **European Digital Competence Framework for Citizens (DigComp)**, offers a tool to improve citizens' digital competence. DigComp was first published in 2013 and later two new versions have been released - the latest one in spring 2017 - and has become a reference for many digital competence initiatives at both European and Member State levels. It is developed by the Institute for Prospective Technological Studies (IPTS) of the Commission's Joint Research Center (JRC). DigComp 2.0 structures **21 competences in 5 competence areas**, as:

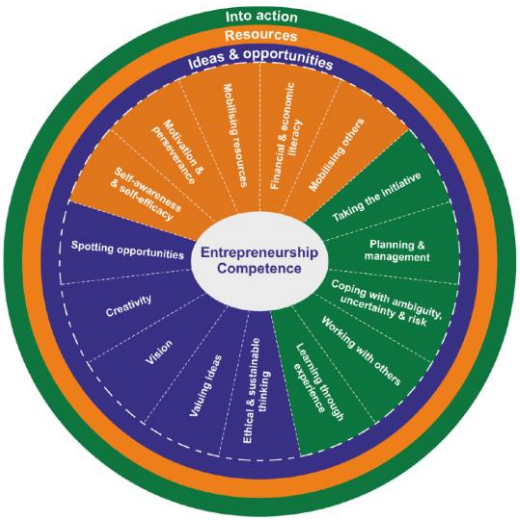
1. Information and data literacy,
2. Communication and collaboration,
3. Digital content creation,
4. Safety and
5. Problem solving.

DigComp competences are integrated into the ESCO list of digital transversal skills (Kluzer, Pujol Priego, 2018).

Entrepreneurship Competence Framework (EntreComp)

The **Entrepreneurship Competence Framework (EntreComp)**[6](2016) was developed by the Joint Research Centre (JRC) of the European Commission on behalf of the Directorate General for Employment, Social Affairs and Inclusion (DG EMPL). It describes entrepreneurship as a lifelong transversal competence, which applies to all spheres of life: from nurturing personal development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and also to starting up ventures (cultural, social or commercial). EntreComp identifies what are the elements that make someone entrepreneurial and describes them to establish a common reference for initiatives dealing with entrepreneurial learning. It consists of 3 interrelated and interconnected competence areas: 'Ideas and opportunities', 'Resources' and 'Into action'. Each of the areas is made up of 5 competences, which, together, constitute the building blocks of entrepreneurship as a competence. The framework develops the 15 competences along an 8-level progression model and proposes a comprehensive list of 442 learning outcomes. EntreComp embraces all different types of entrepreneurships, including intrapreneurship, social entrepreneurship, green entrepreneurship and digital entrepreneurship and it applies to individuals and groups (teams or organizations) in the private, public and third sectors and in any hybrid combination of the three (Bacigalupo et. al., 2016).

Figure 5: Entrepreneurship Competence Framework (EntreComp)



Source: Bacigalupo et. al., 2016.

[6]https://ec.europa.eu/jrc/en/entrecomp

ResearchComp: The European Competence Framework for Researchers

Research and innovation play vital roles in shaping the progress and well-being of society in numerous ways. Research and innovation drive the development of new technologies that improve efficiency, productivity, and quality of life. They are essential drivers of societal progress, contributing to technological advancement, economic growth, health and well-being, environmental sustainability, social equity, cultural enrichment, global collaboration, and resilience. By investing in research and fostering a culture of innovation, societies can address current challenges and create a brighter future for generations to come.Therefore, the development of relevant skills is vital, especially for equipping researchers with the transferrable skills necessary for effective and successful careers in all relevant sectors of the society, including academia, industry, the public administration and the non-profit sector. ResearchComp[7] was developed by the European Commission in close consultation with relevant stakeholders, delivering on the new European Research Area and the Skills Agenda, and contributing to the European Year of Skills. ResearchComp is also the first competence framework aligned with the European Skills, Competences, and Occupations classification (ESCO), as it has been developed on the basis of the taxonomy of transversal skills for researchers that was included in the 2022 version of the classification.
ResearchComp has 3 main dimensions:

- 7 competence areas (cognitive abilities, doing research, managing research, managing research tools, making an impact, working with others, self-management)
- 38 competences
- 389 learning outcomes along
- 4 proficiency levels (foundational, intermediate, advanced, expert)

Each competence is defined by a descriptor, and is further developed with learning outcomes for each of the proficiency levels.It is not suggested that researchers acquire the highest level of proficiency for all 38 competences or have the same proficiency across all the competences. However, researchers should develop competences in all 7 areas.Progression across levels for the various competences can be the result of dedicated training courses, on-the-job-training, peer-to-peer learning, coaching and mentoring.ResearchComp is a tool that helps:

- researchers assess and develop their own transversal skills
- higher education institutions and training providers adapt their offer to researchers
- employers to be aware of the wide set of competences of researchers

Supporting the development of research and innovation transversal skills can foster inter-sectoral careers and can promote the development of highly-skilled talents needed in the complex labour market.

[7] https://research-and-innovation.ec.europa.eu/system/files/2023-04/ec_rtd_research-competence-presentation.pdf

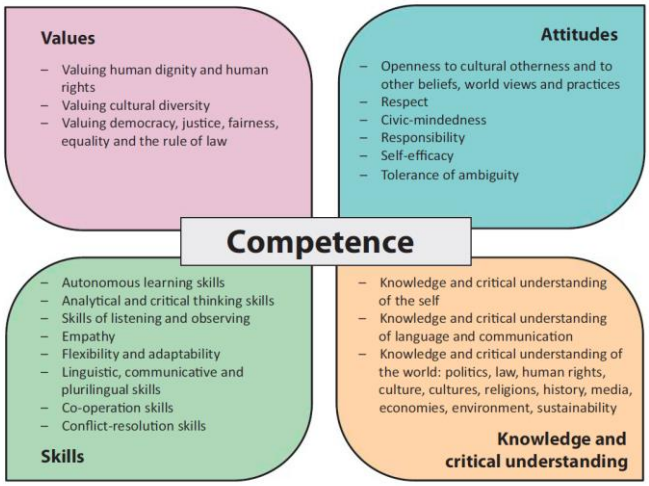
Figure 6: The European Research Competence Framework

Source: European Commission, 2022

Council of Europe Competences for Democratic Culture (2016)

The **Council of Europe Competences for Democratic Culture (2016)**[8]describes a conceptual model of the competences needed for individuals to participate effectively in a culture of democracy and live peacefully together with others in culturally diverse democratic societies. Increased migration, growing diversity, rapid technological transformation and globalisation are having a profound effect on people's identities and way of living, requiring from individuals to communicate effectively with others holding different beliefs, backgrounds and outlooks. Democratic and intercultural competence is defined as the ability to mobilise and deploy relevant values, attitudes, skills, knowledge and/or understanding in order to respond appropriately and effectively to the demands, challenges and opportunities that are presented by democratic and intercultural situations. It describes values, attitudes, skills and knowledge and critical understanding, covering a wide range of intercultural, civic, social and transversal competences. (Council of Europe, 2016).

Figure 7: 20 Competencies for Democratic Culture



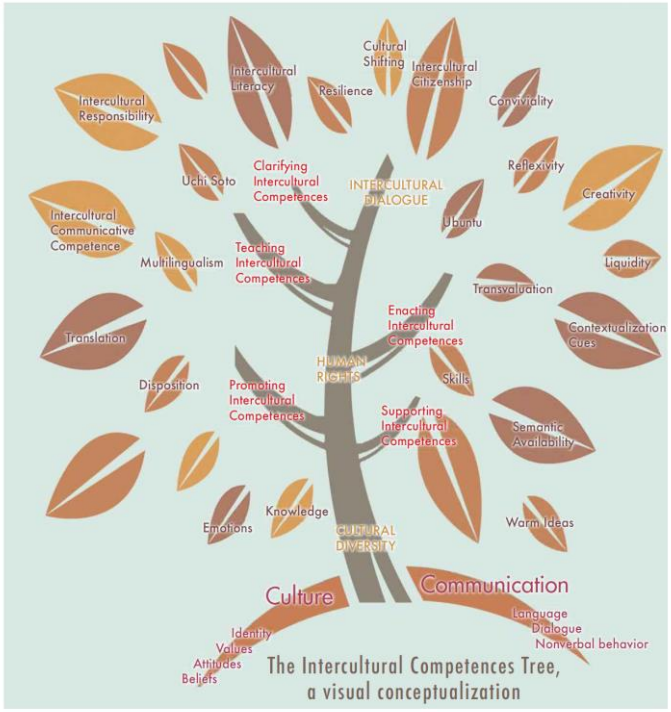
Source: Council of Europe, 2016.

[8] Council of Europe, Competences for Democratic Culture: Living together as equals in culturally diverse societies, 2016

UNESCO Intercultural Competences Framework (2013)

The **UNESCO Intercultural Competences Framework (2013)**[9]aims to raise awareness on intercultural competences, proposing a toolbox of knowledge, skills andabilities to prepare individuals to a wide variety of diversesituations in daily life.Intercultural competences are abilities to adeptly navigate complex environments marked by a growing diversity of peoples, cultures and lifestyles. They refer also to having adequate knowledge about different cultures and the different issues arising when people of different cultures interact, as well as having the skills needed to interact with diverse groups. The framework includes the relevant and closely interrelated communicative competences (language, dialogue, non-verbal behaviour) and cultural competences (identity, values, attitudes and beliefs). It is visualised in the "Intercultural Competences Tree" to show relationships between the central concepts including cultural diversity, intercultural dialogue and human rights, with numerous other concepts supporting them, most significantly culture and communication. (UNESCO, 2013).

Figure 8: UNESCO Intercultural Competences Tree



Roots: Culture (Identity, Values, Attitudes, Beliefs, etc.) and Communication (Language, Dialogue, Nonverbal behavior, etc.)
Trunk: Cultural Diversity, Human Rights, Intercultural Dialogue
Branches: Operational steps (Clarifying, Teaching, Promoting, Supporting and Enacting Intercultural Competences)
Leaves: Intercultural Responsibility, Intercultural Literacy, Resilience, Cultural Shifting, Intercultural Citizenship, Conviviality, Reflexivity, Creativity, Liquidity, Contextualization Cues, Transvaluation, Ubuntu, Semantic Availability, Warm Ideas, Skills, Uchi Soto, Multilingualism, Disposition, Emotions, Knowledge, Translation, Intercultural Communicative Competence. Some of the leaves have been left free so that this Tree which is very much alive, can be complemented upon the rich diversity of contexts available worldwide.

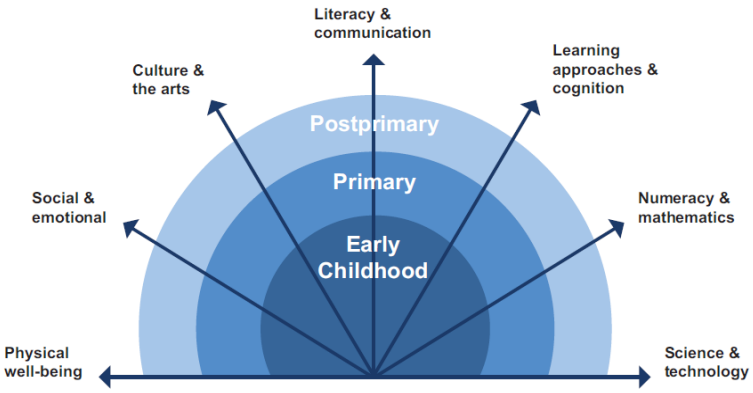
Source: UNESCO, 2013.

[9]http://unesdoc.unesco.org/images/0021/002197/219768e.pdf

UNESCO Global Framework of Learning Domains (2013)

The **UNESCO Global Framework of Learning Domains (2013)**[10] aims to define the competences and the learning outcomes which are universally important. Seven domains and corresponding subdomains of outcomes related to learning were proposed, including social and emotional as well as literacy and communication. The framework is strongly linked to the Sustainable Development Goals and it is intended to form the basis for developing 'learning indicators for global tracking'.It covers early childhood, primary and through the end of lower secondary education but also extends to upper secondary, tertiary or vocational/training level or through non formal learning opportunities, where individuals continue learning and acquiring skills more deeply (UNESCO, 2013).

Figure 9: Seven Domains for Learning Outcomes



Source: UNESCO, 2013.

Additionaly, UNESCO (2014) has defined the guiding principles for learning, addressing a range of core areas of knowledge, competences and attitudes that are particularly significant in the present world,including: academic honesty, information literacy, critical thinking, creativity, STEM (science, technology, engineering and mathematics) learning, concepts-focused learning, health and mindfulness, service learning, learning support, assessment.

[10] UNESCO, Centre for Universal Education at Brookings, Towards Universal Learning. Recommendations from the Learning Matrix Task Force, September 2013

OECD Programme for the International Assessment of Adult Competencies (PIAAC)

The Organisation for Economic Co-operation and Development (OECD) has been focusing on conducting policy-oriented research to promote development, activating and effectively using skills and on strengthening national skills systems and better international skills policies to achieve economic growth and social inclusion.The **Survey of Adult Skills**[11] within the **OECD Programme for the International Assessment of Adult Competencies (PIAAC)** is an international survey conducted in over 40 countries, measuring the key cognitive and workplace skills needed for individuals to participate in society as well as for economies to prosper. The survey recognizes that **literacy, numeracy and problem-solving skills in complex technological environments** are necessary for adults in all workplaces, while **basic skills in science, technology, engineering and mathematics are the basis of technology creation, innovation and entrepreneurship**. As indicated in OECD reports, proficiency in literacy, numeracy and problem solving in technology-rich environments is positively and independently associated with a 20% increase in the probability of participating in the labour market and a 10% increase in the probability of being employed as opposed to being unemployed, as well as with an 8% increase in hourly wages, on average across countries (Quintini, 2014). Also, the OECD research identifies and assesses four broad categories of generic work skills: **cognitive skills, interaction and social skills, physical skills, and learning skills** (OECD, 2018). Along with cognitive skills, social and emotional skills[12], referring to individual attributes, behaviours and beliefs are commonly identified as an element of the set of 'key competencies' required for success in the labour market and more generally in life. The **Behavioural Competencies module of the PIAAC survey**has identified 13 traits which are expected to be instrumental to success in education and the workplace, based on relevant research that shows that certain personality characteristics predict educational success to a degree comparable to cognitive ability measures as well as being predictive of workforce success (Kankaraš, 2017).

[11] The PIAAC survey www.oecd.org/skills/piaac- built upon the experiences learned from previous surveys measuring adult skills across OECD countries, the International Adult Literacy Survey (IALS) and the Adult Literacy and Life Skills Survey (ALL) -assesses the proficiency of working-age adults (16-64 years old) in literacy, numeracy and problem-solving in a technology-rich environment, aiming to provide a comprehensive picture of key skills among the working-age populations in OECD and selected non-OECD countries. PIAACsurvey focuses on how these skills are used at work and in society, how they are modified by education, training and adult learning experiences, what are the outcomes of these skills in terms of wages, employment, economic growth and productivity and social well-being. The PIAAC background questionnaire includes a range of information regarding the factors which influence the development and maintenance of skills such as education, social background, engagement with literacy and numeracy and ICTs, languages, as well as information on outcomes which may be related to skills. Respondents are also asked about the frequency with which they performed specific tasks at work and in everyday life and whether their skills and qualifications matched their job requirements.

[12] *New elements included in the Second Cycle of the PIAACsurvey.*

Table 4: Behavioural Competencies Personality Traits

Broad Personality Category	Personality Trait	Description of Personality Trait
Conscientiousness	Diligence	Diligence describes behaviors associated with working towards objectives. Individuals who are high in diligence tend to be described as hard working, ambitious and confident.
	Organization	Organization describes behaviors associated with maintaining a sense of order as well as an ability to plan work tasks and work activities.
	Dependability	Dependability describes behaviors related to a sense of personal responsibility. Individuals who are high in dependability tend to be reliable and make every effort to keep promises.
	Self Discipline	Self Discipline indicates an ability to be patient, cautious and level-headed. People who are high in self discipline tend to maintain control at work.
Extraversion	Assertiveness	Assertiveness indicates an ability to take charge at work. People who are assertive are often described as direct, decisive and "natural leaders."
	Friendliness	Friendliness indicates an interest in social interactions. People high in friendliness are often interested in meeting new people at work and using this skill for the betterment of the organization.
Agreeableness	Generosity	Generosity describes individuals who are willing to offer their time and resources in support of others. People high in generosity tend to be helpful to others at work.
	Collaboration	Collaboration describes individuals who are viewed as trusting and cooperative. People high in collaboration are often easy to get along with and work well on teams.
Emotional Stability	Stability	Stability describes individuals who are relaxed and worry free. People high in stability work well with changing work priorities and manage stress well.
	Optimism	Optimism describes individuals who have a positive outlook and cope well with setbacks. People who are optimistic tend to incorporate feedback well at work
Openness to Experience	Creativity	Creativity describes behaviors that are inventive and imaginative. People high in creativity tend to be innovators at work.
	Intellectual Orientation	Intellectual Orientation is indicative of an ability to process information and make decisions quickly. People high in intellectual orientation are often viewed as knowledgeable by others.
	Inquisitiveness	Inquisitiveness describes behaviors that relate to being perceptive and curious. People high in inquisitiveness tend to be interested in learning more by attending workshops at work.

Source: OECD, Education & Skills Online Assessment.

PIAAC assessment is based on the use of existing items that have demonstrated their validity and reliability as measures of personality facets that have relevance and utility for academic and workforce readiness and success. Responses to other items in the background questionnaire permit to derive indicators of adults' "readiness to learn" and some elements of informal learning on the job. Finally, PIAAC also collected information on four elements of wellbeing: trust; political efficacy; volunteering; and self-reported health status (Martin, 2018).

Skills intelligence

Following the launch of EU Skills Panorama, the European Commission and Cedefop, building on over a decade of experience in developing and disseminating skills intelligence, bring together ongoing analytical and research work to provide better and more synthetic evidence on current and future skills and labour market trends. The Skills intelligence online tool[13]uses narrative-driven visualisations to help policymakers and other skills intelligence users understand what is trending in occupations, sectors, countries, and skills.

O' NET system&taxonomy

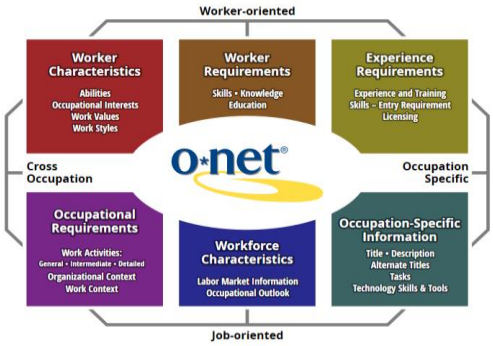
The **U.S. Department of Labor's O*NET system** has organized Skills[14] into the categories as follows:

- **Basic Skills** such as mathematical computation, speaking, writing, and information handling.
- **Social Skills** such as teaching, counselling, coaching, instructing, and persuasion.
- **Complex Problem-Solving Skills** such as diagnosing problem causes, decision-making and innovation.
- **Technical Skills** such as technical design, using, installing and repairing equipment.
- **Systems Skills** such as computer literacy.
- **Resource Management Skills** such as financial and money management, leading and coordinating the activities of others, goal setting, and time management, etc.

Based on the Standard Occupational Classification, the O*NET-SOC taxonomy[15] currently includes 974 occupations which currently have data collected from job incumbents or occupation experts (NCO*NET, 2010).

The O*NET model covers six main domains:

*Figure10 O*NET domains*



Source: Tippins and Hilton (2010), p.8.

[13]https://www.cedefop.europa.eu/en/tools/skills-intelligence
[14]https://www.onetonline.org/find/descriptor/browse/Skills/
[15] O*NET Resource Center (www.O*NETcenter.org).

- **Worker Characteristics** which cover enduring characteristics that may influence both work performance and the capacity to acquire knowledge and skills, including: abilities; occupational interests (encompassing personality traits); work values; and work styles.

- **Worker Requirements** that are descriptors referring to work-related attributes acquired and/or developed through experience and education. These include: basic skills; generic skills; knowledge; and prior education.

- **Experience Requirements** that relate to work related experience that may be needed, including: specific prior experience **and** training; basic and cross-functional skills and entry requirements; licensing and other certificates, registrations or credentials needed.

- **Occupation-Specific Information** which includes other Content Model elements needed in specific occupations, such as: particular tasks; and use of special tools, technology or machines that workers may need to function in the workplace.

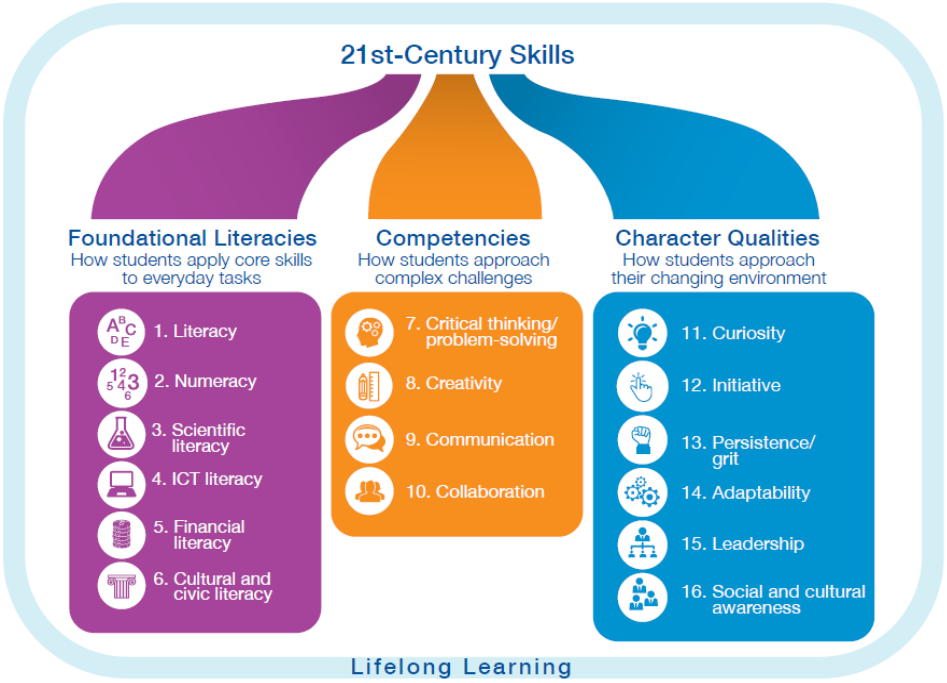
- **Workforce Characteristics** which cover variables that define and describe the general characteristics of the occupations concerned, including: Labour Market Information (current labour force characteristics of those employed in the occupations); and Occupational Outlook (prospects for these occupations) and,

- **Occupational Requirements** that describe what various occupations require, covering: generalized and specific work activities (types of behaviours occurring in many different jobs); and organizational and general work context (the latter covering physical and social factors that influence the nature of work in the job).

World Economic Forum 21st Century Skills

The **World Economic Forum framework**(2015)[16]identifies the skills needed in the 21st century to thrive in today's innovation-driven economy, after a study of nearly 100 countries, revealing large gaps in selected indicators for many skills – between developed and developing countries, among countries in the same income group and within countries for different skill types. WEF stresses that the rapidly evolving, technology-mediated world, requires from individuals not only possess strong skills in areas such as language arts, mathematics and science, but they must also be adept at skills such as critical thinking, problem-solving, persistence, collaboration and curiosity. WEF 21st CenturySkills are categorised as **foundational literacies,** which are core skills to everyday tasks, **competencies,** skills necessary to approach complex challenges and **character qualities,** skills referring to approach changing environment(World Economic Form & Boston Consulting Group, 2015).

Figure 11: WEF 21st – Century Skills



Source: World Economic Form & Boston Consulting Group, 2015.

[16] World Economic Form and Boston Consulting Group, New Vision for Education: Unlocking the potential of Technology, 2015

Identifying Industry 4.0 and new emerging Career Competencies

As already highlighted, **skills have become increasingly important in the globalized world and are closely interrelated to labour market integration and employability,** with the employers to seek for employees not only possessing high level vocational and technical skills but also other personal characteristics and capabilities. Businesses in many countries report they have difficulty in finding the talent they need, and workers often complain of under qualified or even overqualified skills(McKinsey Global Institute, 2018). The OECD (2016) finds mismatches both in the skills of individuals and in the educational credentials they hold, compared with what companies need. International research findings confirm that employers report difficulties in finding workers with the right skills and competencies and that problems with talent and key skills are affecting business performance (Nikolaou et al., 2019, World Economic Forum, 2014, Adecco, 2017). In fact, despite high levels of unemployment in Europe –particularly among young people –40 % of employers cannot find people with the right skills to fill their vacancies (Eurofund, 2015). CEDEFOP stresses that with mass job destruction and sectoral restructuring following the recent economic crisis, four in 10 EU employers had difficulty finding people with the right skills, while unemployment rates peaked, and rapid digitalisation and technological skills obsolescence has also raised concerns about the extent to which the EU workforce is adequately prepared for the fourth industrial revolution (Cedefop, 2018). Among the most desirable soft skills that employers are looking for are **adaptability, flexibility, decision-making, and resilience**(Gray,2016). There is also wide emphasis in the literature that **soft skills determine employability**, reporting that the main soft skills related to employability are: professionalism, reliability, ability to cope with uncertainty, ability to work under pressure, ability to plan and think strategically, capability to communicate and interact with others, written and verbal communication skills, information technology skills, creativity and self-confidence, self-management, and willingness to succeed (Massaro et. al., 2015, Andrews and Higson, 2008).

In this scope, **Industry 4.0 creates disruptive transformations** in the operation of systems and processes, related to production, management, governance and services provision as a result of new and innovative technological developments (Davies, 2015; Schwab, 2016). As entire industries adapt and new ones are born, many professions may become extinct or will undergo a fundamental transformation (World Economic Forum, 2016). According to research, the activities most susceptible to automation include tasks in predictable environments or occupations. Automation will have less impact on jobs involving people management, expertise and social interactions (McKinsey Global Institute, 2017; ILO 2018; WEF, 2016; Frey, Osborne, 2013; Kergroach, 2017), as well as the ability to develop new skills and especially skills that are difficult to automate. In this context, today's youngsters and students, being at the starting point of their careers, will face unpredictable changes in the labour market, including new types of jobs and tasks, or professions that do not exist today. Considering the need to increase the responsiveness and flexibility of VET systems being adaptable to labour market

needs, the Careers 4.0 project highlights the outstanding role of service providers and professionals working in the field of education, training, employment, and career counselling, and their need for upskilling so as to be able to prepare the individuals with the appropriate set of skills to enable effective carers transitions against transformative employment challenges. In addition, **Careers 4.0 project aims to respond to the critical need for modern and updated career guidance tools and LMI material to enable the development of aligned career aspirations, career information and management and informed decision-making in the context of future trends**.

The ongoing rapid changes in the world of work, in view of the **4th industrial revolution** is leading to a **wide workforce skill shift**, mostly caused by automation and artificial intelligence (AI) transforming the nature of work.

According to the **World Economic Forum (WEF)** (2016), the workplace, as shaped by the technological changes of the 4th Industrial Revolution, requires a new and adaptive way of thinking, the ability to reach solutions and responses beyond those based on rules, competitive thinking, the ability to "translate" huge amounts of data in abstract concepts and understanding of data-based reasoning to enable understanding of this information, writing ability and comprehension of concepts in multiple disciplines, cognitive information discrimination and filtering capacity, capacity for productive work in a virtual team and the ability of a "new partnership" with the new "smart" machines that will enter in offices, factories and homes. WEF predicts that more than 35% of the skills considered important in the current workforce will change rapidly in the coming years. In the context of the WEF research, human resources executives and top executives worldwide were asked to clarify the meaning of the current changes brought by the 4th Industrial Revolution, especially in terms of employment, skills and recruitment, **identifying the following skills required by 2020:**

- complex problem solving - problem solving in technology-rich environments
- critical thinking
- creativity
- people management
- coordinating with others
- emotionalintelligence – empathy
- judgment and decision making
- serviceorientation
- negotiation
- cognitive flexibility

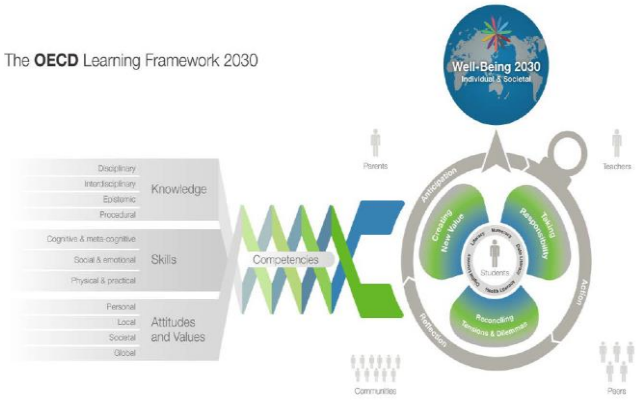
The International Labour Organisation (ILO) (2018) also reports that automation and robotization will increase the demand for the **appropriate combination of technical, vocational and core work skills** to enable workers moving easily between jobs, occupations and sectors ensuring sound future employment prospects. Technical skills that can facilitate problem-solving and innovation, particularly in occupations related to science, technology, engineering and mathematics (STEM) as well as new jobs emerging in the green economy, accompanied with specific vocational skills will be required to deploy, operate and

maintain new technologies and environmental sustainability. In addition, resilience to change, the adaptive capacity to improve skills over the life cycle, as well as a range of non-cognitive social and behavioural skills will be of key importance to combat the disadvantages that all employees but especially low-skilled workers currently face on the labour market.

The **Organisation for Economic Co-operation and Development (OECD) (2018),** within the project Future of Education and Skills 2030, has defined a framework of the knowledge, skills, attitudes and values needed in order for individuals to face multiple and complex challenges – social, economic and environmental – driven by accelerating globalisation and a faster rate of technological developments. The emerging needs to exploit all the new opportunities and solutions created by the unprecedented innovation and knowledge in science and technology, the climate change and the depletion of natural resources requiring urgent action and adaptation, the global financial interdependence and social challenges pertaining to global population grow, migration, urbanisation, increasing social and cultural diversity, conflict, instability and inequalities are major global trends affecting individual lives universally. In this respect, building on the OECD DeSeCo Key Competencies, three further categories of competencies have been identified; the "**Transformative Competencies**" that together address the growing need for individuals preparing for 2030 to be innovative, responsible and aware:

- **Creating new value:** Individuals need to be able to think creatively, co-operate and collaborate with others to draw on existing knowledge to create new knowledge, develop new products and services, new jobs, new processes and methods, new ways of thinking and living, new enterprises, new sectors, new business models and new social models. The constructs that underpin the competency include **adaptability, creativity, curiosity and open-mindedness.**
- **Reconciling tensions and dilemmas:** Individuals need to be adept at balancing equity and freedom, autonomy and community, innovation and continuity, and efficiency and the democratic process. Striking a balance between competing demands will rarely lead to an either/or choice or even a single solution. Also be able to think in a more integrated way that avoids premature conclusions and recognises interconnections, demonstrate capacity to understand the needs and desires of others, think and act in a more integrated way, taking into account the interconnections and inter-relations between contradictory or incompatible ideas, logics and positions, from both short- and long-term perspectives. In other words, individuals have to learn to be systems thinkers.
- **Taking responsibility:** Individuals need to be able to deal with novelty, change, diversity and ambiguity, to think for themselves and work with others, to consider the future consequences of one's actions, to evaluate risk and reward, to accept accountability for the products of one's work, to act ethically, demonstrating a sense of responsibility, and moral and intellectual maturity, self-regulation, self-control, self-efficacy, responsibility, problem solving and adaptability. The third transformative competency is a prerequisite of the other two. (OECD, 2018)

Figure 12: The OECD Learning Framework 2030: Work-in-progress



Source: OECD, 2018.

Also, a new report from the McKinsey Global Institute (MGI, 2018) highlights the new skills that will be needed for workers by 2030, due to automation and artificial intelligence (AI), changing the skills needed in the workforce globally. The study places the skills in five different categories: 1. physical and manual, 2. basic cognitive, 3. higher level cognitive, 4. social and emotional and 5.technological. Research focuses on **25 key skills in the workplace, today and in the future**, for the United States and five European countries, with a special focus on five areas: banking and insurance, energy and mining, healthcare, manufacturing and retailing.

Figure 13: McKinsey Global Institute workforce skills model

Category	Hours worked in 2016, % United States and Western Europe	Skills	Sample occupations
Physical and manual skills		General equipment operation and navigation	Drivers, assembly line workers
		General equipment repair and mechanical skills	Car and truck mechanics
		Craft and technician skills	Stonemasons, roofers, electricians
		Fine motor skills	Nurses, food preparation workers
		Gross motor skills and strength	Machine feeders, cleaners, packers
		Inspecting and monitoring skills	Security guards, quality control
Basic cognitive skills		Basic literacy, numeracy, and communication	Cashiers, customer service
		Basic data input and processing	Typists, data entry, accounting clerks
Higher cognitive skills		Advanced literacy and writing	Editors, paralegals, writers
		Quantitative and statistical skills	Financial analysts, accountants
		Critical thinking and decision making	Doctors, insurance underwriters
		Project management	Purchasing agents, front-line supervisors
		Complex information processing and interpretation	Market research analysts, lawyers
		Creativity	PR specialists, music composers
Social and emotional skills		Advanced communication and negotiation skills	Sales representatives, real estate agents
		Interpersonal skills and empathy	Counselors, social workers, therapists
		Leadership and managing others	Managers, executives
		Entrepreneurship and initiative-taking	Business development, strategists
		Adaptability and continuous learning	Emergency responders, programmers
		Teaching and training others	Teachers, instructors, trainers
Technological skills		Basic digital skills	Administrative assistants, desktop publishers
		Advanced IT skills and programming	Software development, network administrators
		Advanced data analysis and mathematical skills	Statisticians, operations research analysts
		Technology design, engineering, and maintenance	Engineers, robotics experts, product designers
		Scientific research and development	Scientists

NOTE: Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

SOURCE: McKinsey Global Institute workforce skills model; McKinsey Global Institute analysis

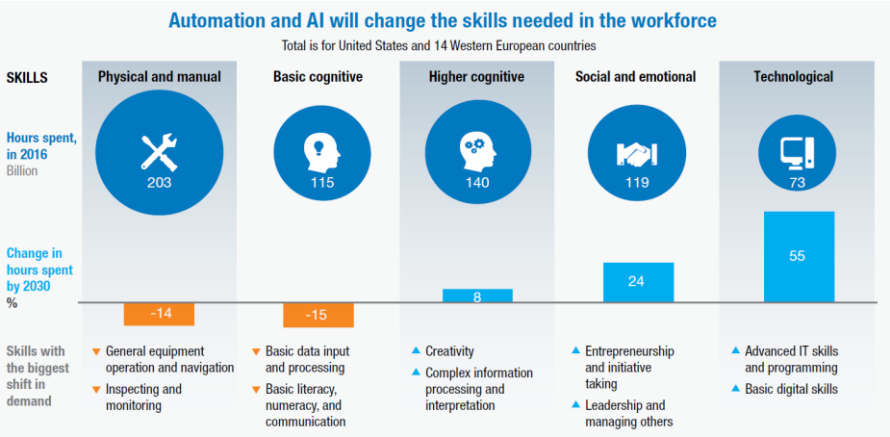
Source: McKinsey Global Institute (MGI) 2018.

According to MGI, there is a sharp increase in skills that fall into the last three categories and are necessary in many different work environments and occupations:

- **Higher level of cognitive skills**, including superior writing, quantitative and statistical skills, critical thinking and complex information processing.
- **Social and emotional skills,** include high-level communication and negotiation, empathy, lifelong learning, ability to manage others, and adaptability.
- **Technological skills**, including basic to high-level ICT skills, data analysis and research, science, technology, engineering and mathematics [STEM].

The research findings on the forthcoming changes in labour force skills demand and the way in which work is organized in business, as people begin to interact with machines in the workplace, predict that automation will accelerate the shift of required labour workforce skills far from what we have seen over the last 15 years. The largest increase in demand will be for technological skills - the lowest in demand category today –which will grow by 55% and by 2030 will account for 17% of working hours, comparing to 11% in 2016. This increase will affect the demand for basic digital skills as well as for advanced technological skills such as programming. Demand for social and emotional skills, such as leadership and people management will increase by 24%, to 22% of working hours. Demand for higher cognitive skills will increase overall, but will grow strongly for some of these skills, especially creativity. On the other hand, some skill categories will be less demanded. Basic cognitive skills, including data entry and processing, will be reduced by 15%, dropping from 18% to 14% of working hours. Demand for physical and manual skills, including general equipment, will also decline by 14%, but will remain the largest category of workforce skills in 2030 in many countries, accounting for 25% of total hours of work (McKinsey Global Institute, 2018).

Figure14: Automation and AI will change the skills needed in the workforce



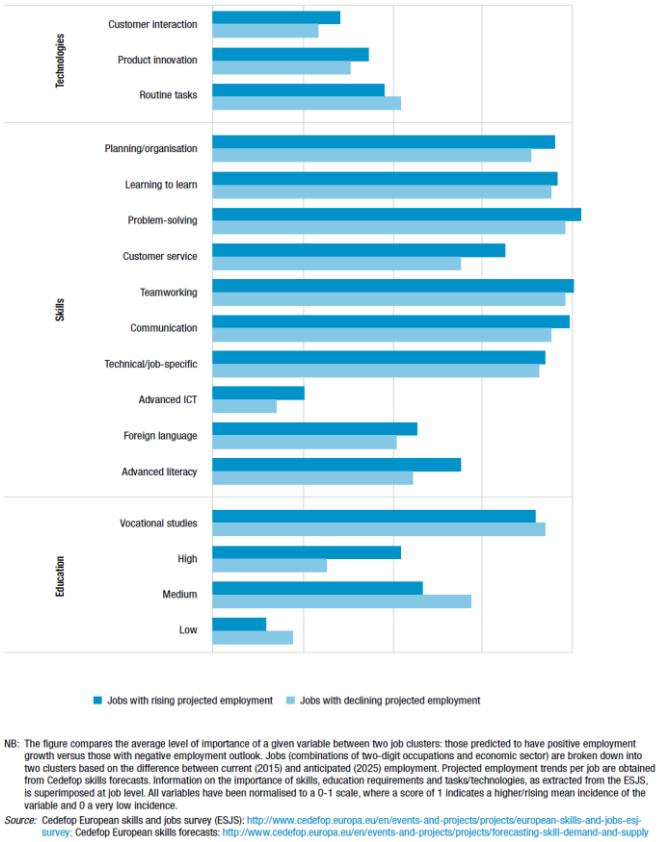
Source: McKinsey Global Institute (MGI) 2018.

In the same spirit, PIAAC data and OECD work provide no basis for complacency in the view of the 4th Industrial Revolution, showing that the content of most jobs will be affected by digitization and this will have important implications for the requirements on new skills. For example, it is confirmed that digitization is likely to

squeeze the demand for low-skilled workers who take on routine tasks and expand the demand for workers who are capable of abstract thinking, creative work and problem solving. In addition, it is recognized that the so-called "soft skills" such as communication, teamwork, empathy, self-motivation and leadership will be equally important, if not more, than cognitive skills (Martin, 2018, Kankaraš, 2017).

Also, **Cedefop's European Skills and Jobs Survey (ESJS)** on employment projections for different sectors and occupations has been linked to the average relative importance of specific skills, with the findingsproviding evidence that much of the anticipated employment growth in the next decade is associated with jobs that have entailed greater product innovation and customer-service orientation in recent years.It is also evident that jobs with positive employment prospects are more likely to rely on advanced cognitive (literacy, numeracy, foreign-languages, problem-solving, learning) and socioemotional (communication, planning, customer service) skills. Other interesting findings reveal a complementarity between ICT and non-ICT skills at work, highlighting that digital work-places also require strong foundation skills (such as literacy) and a higher degree of planning, personal adaptability and ability to screen and filter out essential evidence, while the digital transformation affecting organisation restructuring in turn, calls for a greater need for team-working, cooperation and leadership skills, as well as interpersonal and customer interaction skills (Cedefop, 2018).

Figure 15: Change in skill demand due to anticipated job restructuring, 2015-25, EU-28



NB: The figure compares the average level of importance of a given variable between two job clusters: those predicted to have positive employment growth versus those with negative employment outlook. Jobs (combinations of two-digit occupations and economic sector) are broken down into two clusters based on the difference between current (2015) and anticipated (2025) employment. Projected employment trends per job are obtained from Cedefop skills forecasts. Information on the importance of skills, education requirements and tasks/technologies, as extracted from the ESJS, is superimposed at job level. All variables have been normalised to a 0-1 scale, where a score of 1 indicates a higher/rising mean incidence of the variable and 0 a very low incidence.

Source: Cedefop European skills and jobs survey (ESJS): http://www.cedefop.europa.eu/en/events-and-projects/projects/european-skills-and-jobs-esj-survey; Cedefop European skills forecasts: http://www.cedefop.europa.eu/en/events-and-projects/projects/forecasting-skill-demand-and-supply

Source: Cedefop, 2018

In addition, a new Cedefop / Eurofound report highlights skills as a key element in policies to maintain economic growth and productivity, as well as helping to address a range of other social and economic issues.Based on the 2016 Eurofound comprehensive framework, which includes physical, social and intellectual content of tasks and the use of ICT, in terms of what is to be done at work, an analysis of the structure of employment in Europe was conducted, mapping the implications of projected structural change of employment in Europe up to 2030, using data from various international sources – Eurofound's European working conditions survey (EWCS)[17], the OECD survey of adult skills PIAAC[18], the American O*NET database[19] and the European labour force survey[20] (Cedefop, Eurofound, 2018).

Figure 16: Eurofound Classification of tasks according to their content and method

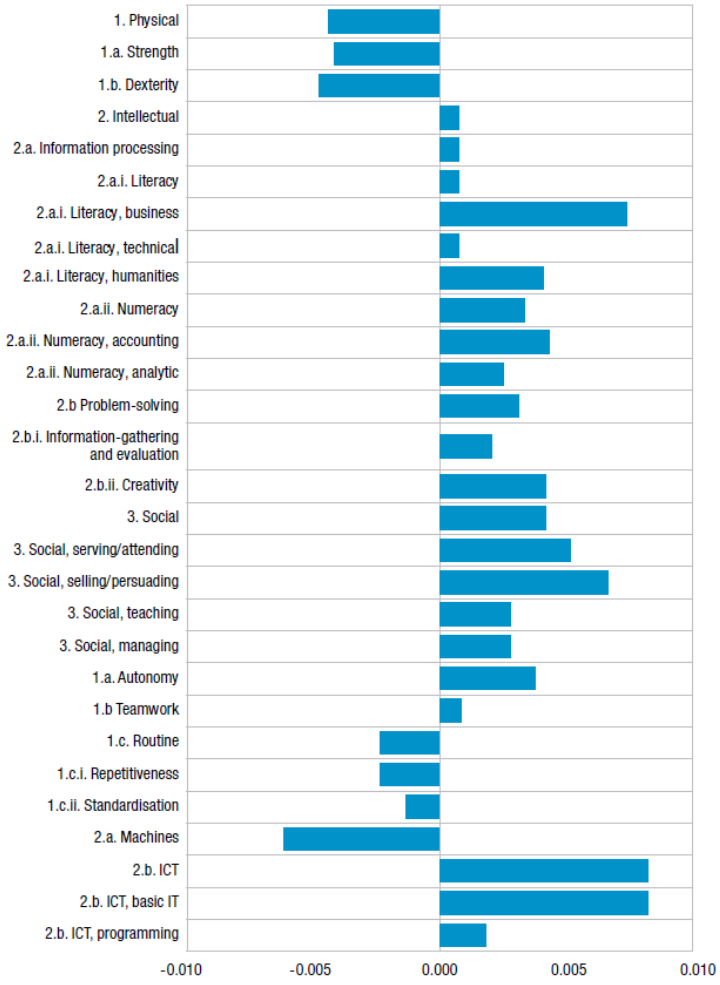
A. In terms of the content	B. In terms of the methods and tools of work
1. **Physical tasks:** aimed at the physical manipulation and transformation of material things: a. *Strength* b. *Dexterity* 2. **Intellectual tasks:** aimed at the manipulation and transformation of information and the active resolution of complex problems: a. *Information processing:* I. Literacy: i. Business ii. Technical iii. Humanities II. Numeracy: i. Accounting ii. Analytic b. *Problem solving:* I. Information gathering and evaluation of complex information. II. Creativity and resolution. 3. **Social tasks:** whose primary aim is the interaction with other people: a. *Serving/attending* b. *Teaching/training/coaching* c. *Selling/influencing* d. *Managing/coordinating*	1. **Methods:** forms of work organisation used in performing the tasks: a. *Autonomy* b. *Teamwork* c. *Routine* I. Repetitiveness II. Standardisation 2. **Tools**: type of technology used at work: a. *Machines (excluding ICT)* b. *Information and communication technologies:* I. Basic ICT II. Programming

Source: Eurofound (2016).

Findings of the Cedefop/Eurofound report as measured by data from the European working conditions survey shows that the projected structural change will lead to a decline in tasks requiring both physical strength and dexterity, routine tasks (both repetitiveness and standardisation) as well as work with machines, excluding working with ICT-related machinery. On the other hand, it shows an increase of intellectual and social tasks, including business literacy, selling/persuading, problem solving, creativity, autonomy as well as numerical and ICT tasks, requiring the development of the relevant skills (Cedefop, Eurofound, 2018).

[17] https://www.eurofound.europa.eu/surveys/european-working-conditions-surveys
[18] http://www.oecd.org/skills/piaac
[19] https://www.onetcenter.org/database.html
[20] https://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey

Figure 17: Task indices change, 2015-30 (EU) – new skills needed at work



Source: Cedefop, Eurofound, 2018

Research by the McKinsey Global Institute (2021)has looked at the kind of jobs that will be lost, as well as those that will be created, as automation, AI, and robotics take hold. And it has inferred the type of high-level skills that will become increasingly important as a result. The need for manual and physical skills, as well as basic cognitive ones, will decline, but demand for technological, social and emotional, and higher cognitive skills will grow. In this scope, theMcKinseyidentified foundational skills that will help citizens to thrive in the future world of work, defining the 56 Distinct elements of Talent (DELTAs), across 13 skills groups and four categories

Figure 18: 56 distinct elements of Talent (DELTAs)

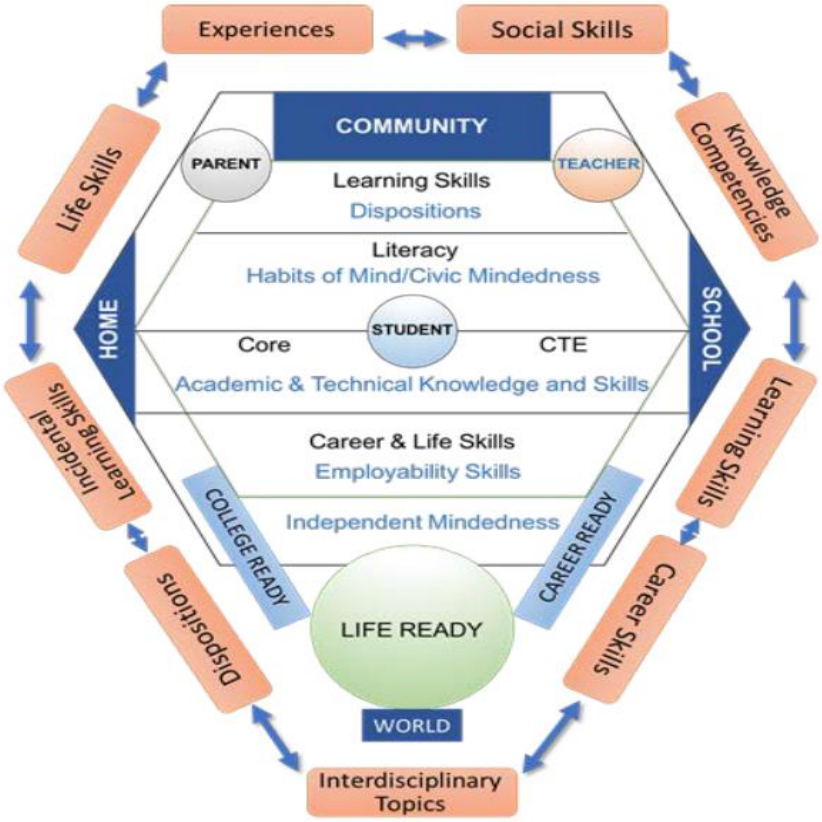
Finally, astrong emphasis is currently placed on the so-called Career Management Skills (CMS) which refer to a series of skills that help individuals collect, analyse, compose and organize information about themselves, education and occupations, as well as skills to make decisions and implement transitions (ELGPN, 2012).Recent career development theories have identified other personal skills that are crucial for effective labour market integration, such as readiness to happenstance, creating alternative career perspectives, career adaptability, career resilience, self-efficacy in career planning and social awareness (Porfeli& Savickas, 2012; Savickas, 2013; Sidiropoulou-Dimakakou et. al. 2012).

Recently, OECD studies have been highlighting the need for the development of career readiness, as the individual capacity to approach labour market entry and imagine career progression from an informed and confident perspective based on critical engagement with the world of work. Career readiness also involves the successfulpreparation for transitions into, and navigation through, future working lives, deploying the knowledge, skills and qualifications developed in education and training systems (Mann, Denis and Percy, 2020). In

this scope, the conceptual model for student readiness inthe 21st century (DiBenedetto & Myers, 2016) and relevant Career Readiness Skills development to prepare for life and the dynamic job market integrates:

- ✓ Academic preparation
- ✓ Career Awareness and Exploration
- ✓ Experiential Learning – work exposure
- ✓ Core Life Competencies & Soft skills (personal traits & behaviours associated to job performance)
- ✓ Lifelong learning for the development of job-specific skills
- ✓ Career Planning and Self-Management skills

Figure 19: Conceptual model for student readiness in the 21st century (DiBenedetto & Myers, 2016)



Conceptual model for the study of student readiness in the 21st century (DiBenedetto & Myers, 2016)

Source: DiBenedetto & Myers, 2016

DiBenedetto & Myers model (2016) defines the following Knowledge, Skills, and Dispositions required of high school students to be career ready in the 21st century.

Table 5: Behavioural Competencies Personality Traits

Construct	Variable
Learning Skills	Contextual Learning, Critical Thinking, Initiative, Perseverance/Grit, Problem Solving, Reasoning, Self-Direction
Life Skills	Accountability, Goal Management, Organizational Skills, Problem Solving, Social/Cross-Cultural Skills, Time Management
Career Skills	Career Decision Making, Job Search Skills, Productivity, Responsibility, Work Habits/Ethics
Social Skills	Understanding Diversity, Ethical Responsibility, Honesty, Integrity, Social Responsibility
Interdisciplinary Topics	Agriculture, Civics, Communications, Economics, Environment, Global Awareness, Health, Technology
Knowledge Competencies	Decision Making, Innovation, Proficiency, Personal Productivity, Teamwork
Incidental Learning Skills	Adaptability, Confidence, Decision Making, Flexibility, Leadership, People Skills, Productivity, Proficiency, Initiative/Self-Direction, Teamwork
Dispositions	Creativity/Creative Thinking, Engagement in Life-Long Learning, Flexibility, Innovation, Motivation, Perseverance/Grit, Personal Productivity, Responsibility, Self-Direction/Self Discipline, Self Esteem
Knowledge Competencies	Decision Making, Innovation, Proficiency, Personal Productivity, Teamwork
Incidental Learning Skills	Adaptability, Confidence, Decision Making, Flexibility, Leadership, People Skills, Productivity, Proficiency, Initiative/Self-Direction, Teamwork
Experiences	Career Related Work Experience/Internship, Community Engagement, Cross Disciplinary Connections, International Engagement, Leadership, Project Management, Teamwork

NACE's[21] Job Outlook 2022 survey, studying career readiness competencies and perceptions of importance between employer and student proficiency, showed that nearly all employers indicated that critical thinking

[21]Established in 1956, the National Association of Colleges and Employers (NACE) is a professional association that connects nearly 17,000 college career services professionals, university relations and recruiting professionals, and the business solution providers that serve this community.

and communication are very to extremely important for college graduates to have to enter their workforce. NACE also defined the Career Readiness: Competencies for a Career-Ready Workforce[22], involving: Career & Self-Development, Communication, Critical Thinking, Equity & Inclusion, Leadership, Professionalism, Teamwork and Technology.

[22]https://www.naceweb.org/career-readiness/competencies/career-readiness-defined/

Development of a Career Competencies 4.0 Framework

ILO (2015) has identified the importance of setting up competency standards as a set of benchmarks that define the skills, knowledge and attributes people need to perform a work role and reflect the needs of the labour market. Competency standards form the basis upon which training and assessment can be implemented to a standard that the industry recognises and trusts. Competency standards are primarily used to develop and implement training, to assess the outcomes of training, as well as to assess the level of a person's existing skills and competencies.

The development of a Career Competencies 4.0 Framework maps the core hard and soft skills needed related to the ongoing structural changes in the global labour market with the aim to match individual career choices and aspirations to rapidly evolving demands and facilitate career navigation. It provides a set of business-oriented hard- and soft-core skills, suitable in the globalised labour market, based mostly on the relevant definitions included in several international classifications, such as ESCO, OECD PIAAC, EU Key Competencies Framework etc. The development of a common understanding and a common language of future-oriented skills and competences is a prerequisite for effective profiling and matching.

While skills assessment and profiling has been highlighted in several studies as a key element for career development and labour market inclusion at EU level, however there is a lack of a common framework as well as unified mechanisms and tools for recognising hard, soft and informal skills, ensuring the transferability of those practices among European Union (EU) Member States. (Marangozov, 2017). The 2018 Reference Framework for key competences[23] in relation to assessment and validation of competence development proposes that key competence descriptions could translate into frameworks of learning outcomes that could be complemented with suitable tools for diagnostic, formative and summative assessment and validation at appropriate levels. Also, the report on Skills/Competences Classification in the EU-27 describes and analyses the relevant national classifications of skills and competences, intended to align with the development of the ESCO classification (European Skills/Competences, qualifications and Occupations), providing an overview of the efforts to standardise the description of competence profiles and revealing several gaps and difficulties in comparability and compatibility to a holistic approach for the development of skills-based assessment, profiling and matching tools (Blázquez, 2014).

In this respect, Careers 4.0 project with the aim to develop a comprehensive model of skills assessment and profiling and following a thorough literature review, as previously presented, on identifying the hard and soft skills needed

[23]https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

in the future labour market proposes a **Career Competencies 4.0 Framework.** The Framework combines:

a. hard skills, which are specific knowledge or abilities, strictly job-specific and core occupational requirements of a job, e.g. digital skills, technical-manual skills etc.
b. soft skills, which are non-job specific, cross-cutting across jobs and sectors (transferable), and closely connected with intangible personal traits and behaviors, essential to preparation for employment, e.g. communication, organization, emotional competence, problem solving etc.

The skills included in the **Career 4.0 Skills Framework** were selected based on the following guiding principles:

- **Definition:** The skill has a commonly used and understood definition based on the literature review of relevant surveys and existing frameworks internationally.
- **Amplitude:** The skill is either strictly job-specific across occupational sectors (hard skills) or closely connected with intangible personal attitudes and competences (soft skills).
- **Transferability/ portability:** The skill can be applied to a wide range of different jobs and industries and can be transferred from one job to another.
- **Relevance to the future work challenges**: The skill, alone or in combination with others, equip people for future employment challenges in a globalised, digitalised and disrupted labour market in view of the 4th industrial revolution.
- **Universality**: The skill is reported to be important globally and across different countries and cultures.
- **Impact**: The skill is proven to have an impact on life and employment outcomes.
- **Interdependency:** The skill can be developed in conjunction with others.
- **Malleability / Learnability**: The skill can be developed or improved through the processes of learning or can be acquired through informal pathways.
- **Measurability**: The skill can be given a comparative numerical value on a scale, or a non-numerical account.

In order to conclude on the final version of the Career Competencies 4.0 Framework, the partners organized **focus groups with employers, and relevant VET stakeholders,** using a participatory research method. The participants in the focus groups were presented with the initial proposal of the framework and the definitions of each included competence and they invited to express their opinion on the **relevance and suitability of each competence** and make additional comments or define other important competences that need to be included in the framework.

In total, 26 persons participated in the national focus groups. 4 in Greece and Italy, 3 in Cyprus and 12 in Romania. Regarding their job position, 26% were HR managers, 17% Career Counsellor or Manager in a department and 13% Entrepreneurs or other.

According to their feedback on the importance of each of the proposed competences in the labour market, the answers of participants revealed that almost all competences are important or highly important (table…). There were only some second thoughts on the competence "physical manual" (M2.09), as some respondents believe that they are not important in all jobs or that in future this competence may not be needed in the extend that are needed today. Though, we believe it's essential to be included in our framework as it will be still needed even in the future in some jobs.

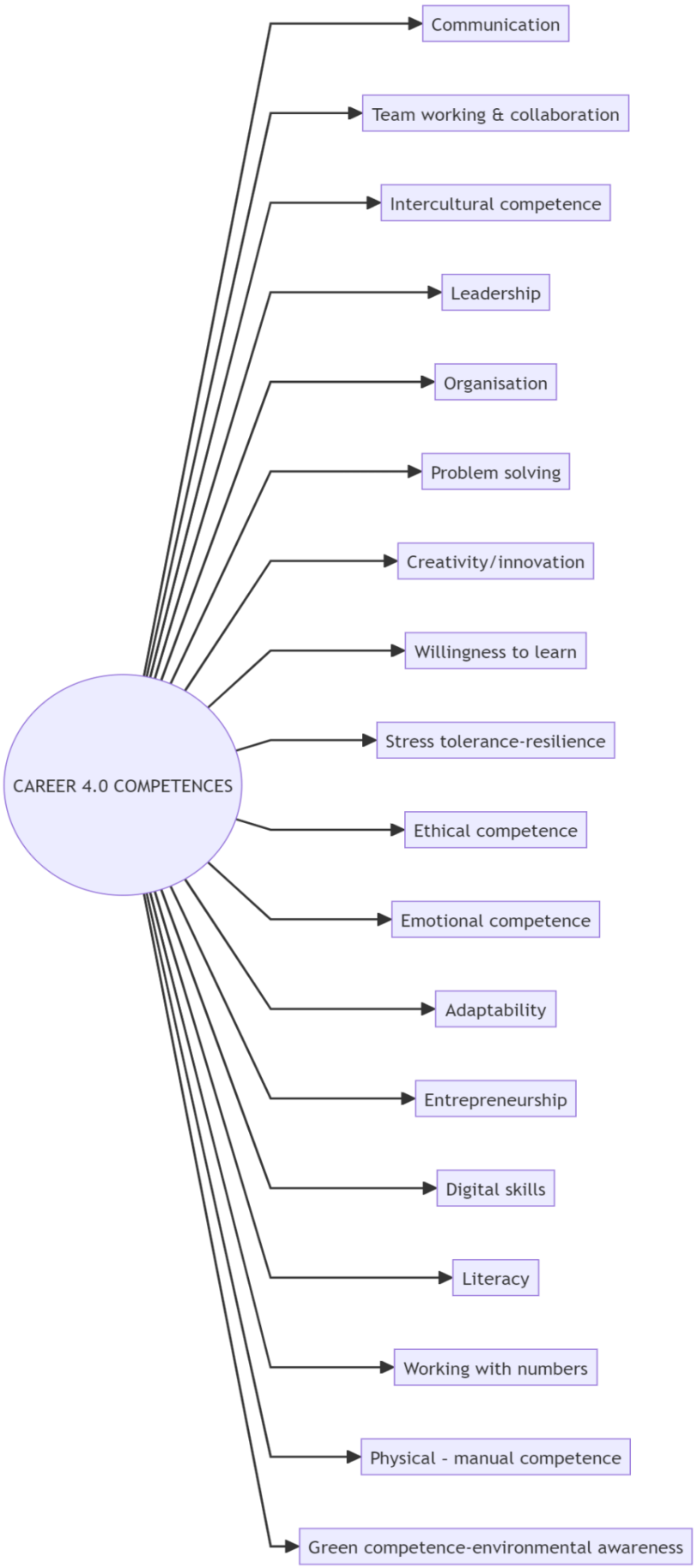
Table6: Mean and Standard deviations of the importance of each competence

Competence	M	SD
communication	3,61	0,50
teamwork	3,48	0,51
Intercultural competence	3,04	0,77
leadership	2,96	0,71
Organisation	3,48	0,51
Work efficiency	3,61	0,58
Problem solving	3,57	0,59
creativity	3,09	0,79
Willingness to learn	3,52	0,51
resilience	3,57	0,51
Ethical competence	3,43	0,66
Emotional competence	3,09	0,85
adaptability	3,44	0,51
entrepreneurship	3,04	0,77
ICT	3,43	0,59
literacy	3,13	0,46
numeracy	2,83	0,65
Physical-manual	2,09	0,87

In the question whether there is any other important competence that should be included in the framework, the answers given were: green skills, goal orientation, and environmental awareness. The goal orientation is already included in our framework within work efficiency, so what we needed to add is the green competence-environmental awareness.

Lastly, according to the experts' feedback one more change in our initial framework is the merge of the work efficiency and organizational skills into one competence: organization. In the end, the final version of the Careers4.0 competencies framework consists of 18 competences, as depicted below (figure20).

Figure 20: Careers 4.0 Competences Framework



Learning and labour outcomes of competences

Below we provide the description of each competence taking into account:

a. **Learning Outcomes:** Learning outcomes refer to the knowledge, skills, and attitudes that individuals acquire through educational programs or courses designed to develop specific competencies. These outcomes are measurable and describe what learners are expected to know and be able to do upon completion of their education or training. They are also essential for assessing the effectiveness of educational programs and guiding curriculum development, and

b. **Labour Outcomes:** Labour outcomes refer to the impact of competencies on employment and career advancement. Individuals with strong competencies are more likely to be successful in the labour market and achieve higher levels of job satisfaction and income. They also play a crucial role in shaping career pathways and opportunities for advancement in various industries and sectors, while the alignment between the competencies developed through education and training and the skills demanded by the labour market is essential for enhancing employability and ensuring a skilled workforce.

Communication

- Able to engage effectively and socially interact in a goal-directed manner with other people encountered at work and social activities e.g. with colleagues, peers, customers, clients etc.
- Able to receive and respond to workplace communication.
- Able to communicate with others face-to-face according to the normal customs and expectations of contemporary social behaviour, appropriate to the context.
- Be interested in meeting new people.
- Able to negotiate and reach mutually beneficial agreements or resolutions through communication and compromise in various contexts, including business, personal relationships, and everyday interactions (negotiation).
- Able to address conflicts or disagreements, fostering open dialogue, and seeking collaborative solutions that reconcile differences and build trust.

Team working & collaboration

- Able to collaborate and easily get along with working with other as a member of a team, being collaborative, trusting and cooperative.
- Coordinating with others, being able to organize one's own work and to link it with the overall workflow, interweaving work programme with the work streams of others.
- Embrace virtual collaboration, utilizing co-creation platforms enabling distributed teams to collaborate on projects, share ideas and crowd source solutions, as well as online communities, and facilitate collaboration and knowledge exchange.

Intercultural competence

- Understand and equally accept people who are perceived to have different cultural affinities.
- Respond and interact effectively and respectfully to diversity.
- Communicate effectively across geographical and cultural boundaries, collaborate with diverse teams, and navigate complex social dynamics and cultural differences to achieve shared goals and objectives.
- Be culturally sensitive and respectful, recognizing and accommodating cultural differences, and avoiding misinterpretations or misunderstandings based on cultural differences.

Leadership

- Able to guide and direct others towards a common goal, often in a group or team.
- Able to influence, inspire, advice, persuade or train others at work.
- Able to oversee, coordinate the work of others and plan others' activities.
- Able to motivate people develop their talents and skills.
- Able to win respect, gaining acceptance for presenting ideas or point of view and influence people and cultivate cooperation.
- Provide positive and constructive performance feedback, set clear expectations and empower teams to succeed.
- Able to build relationships that enable your ability to reduce resistance without authority.
- Able to support and motivate team members, build strong relationships, and promote collaboration and innovation despite physical distance.

Organisation

- Demonstrate self-organisation of one's time and activities, develop one's own ways of doing things, manage own workflow, set goals, deadlines and stay motivated and productive without direct supervision.
- Demonstrate task coordination, attending to several activities simultaneously, prioritizing and switching priorities as necessary, choose or change sequence of job tasks, the speed of work;
- Able to prioritise tasks and actions, manage schedule, estimate duration of work (time management).
- Able to disengage from one task and respond to another or think about multiple concepts at the same time (multi-tasking).
- Able to organize, process, and retrieve information efficiently, using techniques for data organization, file management, and information retrieval.
- Able to work independently, motivating oneself with little or no supervision, and depending on oneself to get things done.
- Able to use technology tools and automation to streamline workflows and save time (e.g. productivity apps, digital assistants, and workflow automation tools to automate repetitive tasks)
- Able to work efficiently, achieve objectives using minimum amount of time, effort, or cost.

Problem solving

- Able to identify problems quickly.
- Able to identify the strengths and weaknesses of various abstract, rational concepts, such as issues, opinions, and approaches related to a specific problematic situation in order to formulate solutions and alternative methods of tackling the situation.
- Able to solve novel, ill-defined problems in complex, real-world settings building upon solid critical think practices (Complex Problem-Solving)
- Able to apply data-driven problem solving, utilising data analytics and insights to inform decision making and identify patterns, trends, and correlations that help diagnose and solve problems more effectively.
- Able to make decisions following a choice from several alternative possibilities.
- Use systematic processes of collecting, analysing, and synthesising information to evaluate current practice and generate new understandings about practice.

Creativity/innovation

- Able to think creatively, generate original ideas by thinking outside the box, exploring and experimenting with novel unconventional approaches.
- Be able to take initiatives for something new without being asked.
- Able to turn ideas into action.
- Be inventive, imaginative, and envision alternatives.
- Demonstrate creative problem-solving, generating novel solutions that may not be immediately obvious to complex challenges or issues so as to address problems effectively.
- Champion new ideas, overcoming resistance to change, and fostering a culture of innovation and agility within the organization.

Willingness to learn

- Embrace a growth mindset, committing to continuous improvement.
- Be proactive in seeking out learning opportunities, staying updated on industry trends, and acquiring new skills to remain competitive in the job market.
- Take advantage of online learning platforms such as Coursera, Udemy, and LinkedIn Learning to enrol in online courses, earn certifications, and acquire new skills at one's own pace and convenience.
- Engage in professional development programs, workshops, seminars as well as experiential learning opportunities, project-based assignments, internships, voluntary work and job rotations to support own career development.

Stress tolerance-resilience

- Able to cope with pressure and ambiguity, handle challenges, and recover from set-backs and adversity by maintaining a positive attitude and reframing challenges as opportunities for growth and learning.
- Able to deal with and manage highly stressful situations by following adequate procedures, communicating in a quiet and effective manner, and remaining level-headed when taking decisions.
- Be effective in modulating anxiety and able to calmly solve problems, be relaxed and handle stress well.
- Able to thrive in the face of uncertainty, embrace change, and leverage emerging opportunities for personal and professional growth.
- Manage work-life balance effectively in hybrid work models, combining remote and in-person work arrangements.
- Cope with stress related to non-standard forms of employment, remote work and flexible work arrangements.
- Promote one's own well-being and mental health.

Ethical competence

- Show integrity and honesty, according a coherent set of ethical principles in work and personal roles.
- Able to build credibility, and long-term relationships, showing integrity and respect for the interests and rights of all parties involved.
- Carry out work tasks and activities according to accepted principles of right and wrong, including fairness, transparency and impartiality in work practices and conduct towards other people.
- Acknowledge ethical implications of emerging technologies such as artificial intelligence, big data, and automation, as well as their impacts on privacy, autonomy, equality, and human rights.

Emotional competence

- Acknowledge and manage emotions, keeping emotions and temper under control (self-awareness, self-regulation).
- Empathize with the perspectives and emotions of others.
- Able to anticipate, recognize and meet others' needs, sometimes even before those needs are articulated (service orientation).
- Demonstrate active listening, articulating thoughts and needs clearly, and asking clarifying questions to ensure mutual understanding between parties.
- Able to understand non-verbal cues such as facial expressions, body language, and tone of voice to gauge emotions and understand others' perspectives.

Adaptability-flexibility

- Able to accept changes.
- Demonstrate willingness to change in order to suit different conditions.
- Able to embrace and deal with uncertainty.
- Able to adapt, adjusting to new conditions, circumstances and cultural environment.
- Able to cope with the tasks of preparing for and participating in the work role and with the unpredictable adjustments prompt by changes in work and working conditions (career adaptability)
- Able to deal with unexpected crises, obstacles or interruptions, then efficiently getting the work back on track, preventing further crises.
- Adjust strategies and proposals based on new information, changing circumstances, or feedback from the other party.

Entrepreneurship

- Able to identify opportunities amid technological disruptions, market shifts, and emerging trends.
- Able to take calculated risks, especially in dynamic and rapidly changing environments.
- Able to tolerate and work constructively within unexpected and unpredictable situations, and seize new opportunities as they arise in fast-paced and uncertain environments.
- Be resourceful in finding innovative solutions and leveraging available resources to drive business growth.
- Able to adapt quickly to changing market conditions, customer preferences, and technological advancements.
- Collaborate with external partners, such as customers, suppliers, start-ups, and research institutions, to co-create value and drive innovation.
- Communicate ideas, garner support from stakeholders, and navigate organizational hierarchies to implement innovative projects or initiatives.
- Possess a strategic mindset, aligning innovative initiatives with organizational goals, vision, and values to create sustainable value for the organization in the long term.

ICT – Digital skills

- Able to manage digital files and folders, able to create, edit, format and print text documents and spreadsheets.
- Maintain familiarity with productivity software, project management platforms, and communication tools. Able to identify digital needs and resources, make informed decisions on most appropriate digital tools according to the purpose or need.
- Able to engage in remote work and virtual teams, communicate and collaborate in digital environments, using tools such as video conferencing, instant messaging, and collaborative platforms to stay connected and productive.
- Able to manage seamless data sharing and real-time collaboration on digital assets such as documents, presentations, and files.

- Able to quickly adjust to new tools and technologies, collaborate with cross-functional teams, and respond to changing market dynamics.
- Have basic coding knowledge
- Respond effectively to connectivity and technology failures.
- Demonstrate openness to digitisation, maintaining technological literacy and digital readiness, by being eager to learn about upcoming technologies.
- Able to access up-to-date information, have a basic understanding of data analysis, complex information processing and interpretation and interpretation using ICT technologies, e.g. applications of big data analytics, so as to enable Data-Driven Decision Making in organizations.
- Able to utilize digital platforms or online marketplaces (e.g. Upwork, Fiverr, Uber, Lyft, TaskRabbit, Airbnb etc) to find and complete tasks, projects, or gigs in exchange for compensation, connecting with others worldwide regardless of physical location.
- Able to build and maintain a personal professional online presence in social media, promote personal brand, network with peers (colleagues, industry experts, recruiters, and potential employers), showcase work portfolio, skills and accomplishments, and explore job opportunities (digital job search).
- Embrace Automation and AI Integration, being able to adapt to work alongside machines, learning to use new technologies, and be involved in tasks/activities that require human – robot interaction.
- Have a basic understanding of cybersecurity practices to protect sensitive data and prevent cyber threats.

Literacy

- Able to learn a foreign language easily and quickly in a given amount of time and under given conditions.
- Able to understand and use of basic written texts and materials (e.g. newspapers, articles, brochures, manuals, directions, instructions, letters, memos, e-mails, diagrams, maps etc.)
- Demonstrate basic writing skills e.g. fill-in applications or forms, write a memo, a message or short report.

Working with numbers- Numeracy skills

- Able to perform day-to-day numeracy and arithmetic calculations to carry out work related tasks (e.g. addition, subtraction, multiplication and division, use of fractions, decimals or percentages, use of calculators).
- Able to calculate prices, costs or budgets, count quantities, calculate and measure e.g. length, distance, liquid, volume, weight, time.
- Able to use advanced maths and complex arithmetic or statistics (e.g. algebra, geometry, calculus, trigonometry, regressions, graphs).
- Able to access, use, interpret, communicate, or use mathematical information to solve a problem or understand a situation.
- Able to find and use mathematical information in tables, graphs, maps, product labels or advertisements.

- Able to use mathematical symbols, language and tools to present information, ideas and processes to communicate mathematical information. E.g. the metric system

Physical – manual competence

- Able to perform intricate and detailed tasks with accuracy and precision.
- Able to demonstrate eye-hand coordination.
- Able to perform repairs and adjustments to mechanical components and systems.
- Able to demonstrate accuracy, concentrate, give attention to detail and avoid mistakes.
- Able to demonstrate spatial ability, work with shape and space, manipulate, organise and interpret spatial information.
- Able to understand mechanical principles and data.
- Able to comprehend how physical force affects mechanics.
- Able to read and interpret technical manuals, blueprints, and schematics to understand mechanical systems and processes Able to operate and service tools and machinery.

Green competence-environmental awareness

- Able to understand environmental issues, such as climate change, pollution, biodiversity loss, and resource depletion.
- Able to promote sustainability in daily lives and advocate for sustainable practices in communities and workplaces.
- Able to reduce environmental impact by conserving resources, minimizing waste, and using eco-friendly products and practices.
- Able to support conservation efforts by participating in activities such as recycling, habitat restoration, and wildlife protection.
- Able to advocate for policies and initiatives that address environmental challenges and promote sustainable development at local, national, and global levels.
- Able to apply green practices into various aspects of their lives, including transportation, energy consumption, food choices, and consumer habits.

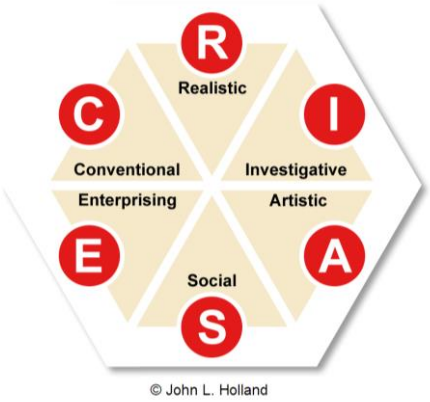
The Careers 4.0 competence framework of selected transferable hard and soft skills and relevant sub-skills, forms the basis for the development of the Careers 4.0 skill assessment ICT based standardized psychometric tool. The development of an accurate and useful skills profiling tool for youth career development and labour market integration purposes will enable objective large-scale qualitative and quantitative assessments, measurement and profiling of youngsters' skills in Europe in view of the Industry 4.0 labour market prospects.

Matching Industry 4.0 skills and competences with Holland's Theory of Career Choice

The general theoretical background for the development of the Careers 4.0 Competencies Framework, recognises the importance of the lifelong learning in the global workplace environments, that addresses not only the cognitive, the emotional dimensions but also the social dimension of learning and skills development and the need to fully map the qualities and abilities of the individual who is required toperform adequately and flexibly in both familiar/routine and unfamiliar/unusual situations. Especially, soft skills have become a subject of increasing interest in lifelong learning, enabling and enhancing personal development, participation in education and training and success in employment.
The Careers 4.0 Framework attempts to re-establish the most frequently used Holland's RIASEC model, featuring the combination ofpersonality interest and work environment as career predictors in the future labour market.

Holland's theory based upon personality types and vocational interests argues that the choice of a vocation is an expression of personality, indicating that people seek and enter those environments that allow them to express their interests and values and exercise their abilities and skills. The degree to which educational and occupational choices lead to the congruence between people's interests and characteristics of their environment will have profound effect on their satisfaction and productivity as well as on their general well-being. Holland's theory assumes individuals' personalities can be described as a combination of six types, as well as there are six basic types of work environment, which correlatedirectly to respective personality types: realistic (R), investigative (I), artistic (A), social (S), enterprising (E) and conventional (C), suggesting the well-known **RIASEC model**.

Figure 21: Holland's RIASEC hexagonal model



Each type is characterised by a certain set of interests, values, skills and life goals, while careers are determined by an interaction between the individual's personality and the environment. The theory claims that people of the same personality type who work together in a job create an environment that suits and rewards their type. Holland created a hexagonal model (figure 55) that shows the relationship between

the personality types and environments, arguing that most people, in reality, are characterized by a combination of mainly 3 types, while the personality types closest to each other are more alike than those opposite of each other (Holland, 1959, 1997).

Table 7: The description of RIASEC personality type of Holland theory RIASEC personality type Description

Realistic type, R	Lacking in social skills and have difficulty coping with interpersonally demanding situations, preferring to work with other realistic individuals or all alone (Holland, 1997; Rocconi et al., 2020; Mason et al., 2020).
Investigative type, I	Possessed the abilities of presenting refined mathematical and scientific skills, but usually lacks leadership skills and the appreciation of science and research situations (Holland, 1997; Armstrong & Vogel, 2009).
Artistic type, A	Creative, preferring to express ideas and materials but lacks skills or bureaucratic organization and tends to avoid occupations or conventional situations (Holland, 1997; Allen, 2005; Ferreira et al., 2016).
Social type, S	Demonstrates excellent helping and teaching skills, and tends to be free of mechanical and scientific skills but refuse working with machines (Holland, 1997; Barrick et al., 2003; Ferreira et al., 2016; Rocconi et al., 2020).
Enterprising type, E	Possessed entrepreneurial leadership skills and persuasive capacity, enjoy working with others but lacks a scientific skills (Holland, 1997; Barrick et al., 2003; Ferreira et al., 2016; Rocconi et al., 2020).
Conventional type, C	Prefer activities that entail explicit, ordered, systematic manipulation of data other than comfortable in settings and not subjected to creative or entrepreneurial demands, preferring to address problems in conventional, tried and tested ways (Holland, 1997; Ferreira et al., 2016).

Source: Khan, Fazal & Wadood, Fazli & Nasser, Saleh & Al-Subari, Abdullah. (2021). A Conceptual Framework of Industrial Revolution 4.0 and Entrepreneurial Orientation

Holland (1959, 1997) describes that over time people develop habitual or preferred methods of dealing with professional tasks (Sheldon et al., 2020). Six different model working environments (RIASEC) have been proposed which correspond to the personality types in that they are situations created by individuals who dominate those environments (Allen, 2005). Holland (1997) summarizes the RIASEC environment interest as follows:

Table 8: The description of RIASEC environment type of Holland theory RIASEC environment type Description

Realistic types, R	Typically involved the environment that requires the usage of machines and tools, fosters technical competency, and reinforces traditional values and an appreciation of goods, money, power and possessions. Example for Realistic careers include cook, farmer, fire fighter, aircraft engineer and electrician (Holland, 1997; Sheldon et al., 2020)
Investigative types, I	Work environment that encourage scientific competencies and achievements as well as involve the observation and investigation of physical, biological or cultural phenomena. For examples mathematician, psychiatrist and biomedical engineer (Holland, 1997; Sheldon et al., 2020).
Artistic types, A	Require competency in the creation of art forms, products, designs, patterns and encourage people to view themselves as expressive, original, intuitive, nonconforming and independent. For instance designer, actors, musicians, architects (Holland, 1997; Allen, 2005; Athanasou, 2017).
Social types, S	Encourage and reward social competence and the ability to be understanding, cooperative, flexible and socially responsible. Social careers include nurse, psychologist, dental hygienist, and physical therapist (Holland, 1997; Athanasou, 2017; Rocconi et al., 2020; Sheldon et al., 2020).
Enterprising types, E	Frequently involve starting up and carrying out projects which these occupations can involve leading people and making many decisions but sometimes they require risk taking and often deal with business. The occupations involved such as business executives, managerial positions, industrial relations (Holland, 1997; Athanasou, 2017; Sheldon et al., 2020).
Conventional type, C	Frequently involve a set of procedures and routines that include working with data and details more than with ideas Conventional careers include librarian, statistician, logistics analyst, and accountant (Athanasou, 2017; Sheldon et al., 2020).

Source: Khan, Fazal & Wadood, Fazli & Nasser, Saleh & Al-Subari, Abdullah. (2021). A Conceptual Framework of Industrial Revolution 4.0 and Entrepreneurial Orientation

Each person's behavior is determined by an interaction between his or her personality and the characteristics of the environment. Based on an individual's personality pattern and the pattern of the environment, some outcomes of such a pairing can, in principle, be forecasted using knowledge of personality types and environmental models. Such outcomes include choice of vocation, job changes, vocational achievement, personal competence, and educational and social behavior (Holland, 1997).

Originally, Holland's theory has also served as a basis for classifying and organizing occupations, as for example the Occupational Information Network (O*NET), where Holland's codes have been integrated. The Dictionary of Holland Occupational

Codes provided a compendium of occupations listed by respective Holland codes (Gottfredson & Holland, 1996).

Careers 4.0 Framework provides the opportunity to match Holland's Personality / Interest Types with the Industry 4.0 skills and ESCO occupations (table 8). This will enable a novel and updated matching of hard and soft skills, involving abilities and personality traits that are considered important in the Industry 4.0 labour market, with the future-oriented professional sectors and occupations, as classified in the European context within ESCO, Cedefop Skill Forecast and other latest studies mapping forthcoming occupational transformation and future trends.

Based on this approach a novel methodology and a relevant Careers 4.0 tool will de provided, enabling the implementation of valid and accurate skills assessment to predict the outcome of person-environment interactions, providing explanations for informed career decisions, evidence-based career matching and adequate professional assistance to people facing several career challenges in view of the Industry 4.0 labour market prospects.

Table 9: Matching Holland's Personality / Interest Types with the ESCO&*Industry 4.0 skills* and occupations

Realistic

Description of type:	**Key skills:**	**Relevant ESCO Occupational sectors/ occupations**	*New occupations in the context of Industry 4.0*
Commonly has athletic or mechanical ability and prefers to work with objects, machines, tools, plants or animals, or to be outdoors. Likes to work with things as opposed to ideas or people and has preference for concrete problems over abstract issues.	Hard skills: Mechanical skills, ICT skills, Technical Skills Soft skills: Organisation, adaptability, willingness to learn, Creativity Professional skills: Using and operating tools, equipment and machinery, designing, building, repairing, maintaining, working manually, measuring, working in detail, driving, working with plants	Science and Engineering Associate Professionals/ Information & communications professionals/ Science and Engineering Professionals/ Production and Specialized Services Managers/ Protective Services Workers/ Market-oriented Skilled Agricultural Workers/ Market-oriented Skilled Forestry, Fishery and Hunting Workers/ Subsistence Farmers, Fishers, Hunters and Gatherers/ Building and Related Trades Workers (excluding electricians)/ Metal, Machinery and Related Trades Workers/ Handicraft and Printing Workers/ Electrical and Electronics Trades Workers/ Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers/ Stationary Plant and Machine Operators/ Assemblers/ Drivers and mobile plant operators, Cleaners and Helpers/ Agricultural, Forestry and Fishery Labourers/ Labourers in Mining, Construction, Manufacturing and Transport/ Food Preparation Assistants/ Street and Related Sales and Services Workers/ Refuse Workers and Other Elementary Workers *Indicative occupations*: *Electrical engineering technician, mechanical engineering technician, electronics engineering technician, pilot, farmer, fisher, horticulturalist, builder, armed services personnel, mechanic, upholsterer, electrician, computer technologist, park ranger, sportsperson, chemical processing plant*	*Automation Technician, CAD Technician (Computer-Aided Design), Quality Control Inspector, Cybersecurity Analyst, Data Analyst, UX/UI Designer (User Experience/User Interface), Science and Engineering Professionals, Artificial Intelligence Engineer, Renewable Energy Engineer, Supply Chain Manager, Operations Manager, Cybersecurity Incident Responder, Digital Forensics Analyst, Precision Agriculture Technician, Smart Fisheries Technician, Agri-Tech Consultant, Building Information Modeling (BIM) Technician, Smart Manufacturing Technician, Digital Print Operator, Smart Home Installer, Smart Factory Technician, Industrial IoT Operator: Robotics Assembler, Autonomous Vehicle Operator, Smart Cleaning Technician, Precision Farming Labourer, Automated Kitchen Assistant, E-commerce Fulfillment Associate, Smart Waste Management Technician, Renewable Energy Specialist, Healthcare Robotics Engineer, Digital Operations Supervisor*

		controller, metal furnace operator, aquaculture production manager, food production operator, animal feed operator, food safety specialist, street food vendor, food preparation assistant, paper slitter operator, block machine operator, surface miner, firework assembler, furniture assembler, photographic equipment assembler, leaflet distributor, building cleaner, room attendant	
Investigative			
Description of type Likes to observe, learn, investigate, analyze, experiment, evaluate, or solve problems primarily of a scientific or mathematical nature. Also prefers working with ideas opposed to people. Usually, doesn't like highly structured settings	**Key skills:** Hard skills:ICT skills Soft skills: Organisational skills, adaptability, willingness to learn, Problem solving, Creativity Professional skills:Thinking analytically and logically, computing, communicating by writing and speaking, designing, formulating, calculating, diagnosing, experimenting.	**Relevant ESCO Occupational sectors/ occupations** Science and Engineering Professionals/ Health Professionals/ Business and Administration Professionals/ Information and Communications Technology Professionals/ Legal, Social and Cultural Professionals *Indicative occupations: Science, research, medical and health occupations, chemist, physicist, geologist, meteorologist, mathematician, statistician, biologist, botanist, zoologist, farming, forestry and fishery advisers environmental protection professional, marine scientist, herbalist, forestry technician, civil engineer, mechanical engineer, chemical engineer, architect, planner, surveyor, electrotechnology engineer, dentist, doctor, generalist medical practitioner, nurse anesthetist, nurse practitioner, chiropractor, applications programmer, software developer, systems analyst, web and multimedia developer, computer network professional, systems administrator,accountant, financial and investment adviser, financial analyst*	*New occupations in the context of Industry 4.0* *Blockchain Architect, Renewable Energy Specialist, Augmented Reality Developer, Telemedicine Specialist, Healthcare Data Analyst, Digital Health Coach, Genomic Counselor, Biotechnology Research Scientist, Digital Transformation Manager, Supply Chain Analyst, AI Strategy Consultant, Cybersecurity Analyst, Cloud Architect, IoT Solutions Architect, Digital Marketing Analyst, UX/UI Designer, Ethical AI Consultant, Coding Instructor, Virtual Reality (VR) Educator, STEM (Science, Technology, Engineering, and Mathematics) Coach, Digital Literacy Mentor, Digital Content Developer, User Experience (UX) Researcher*

Artistic			
Description of type: Tends to have artistic, innovating or intuitional abilities, and likes to work and communicate in unstructured situations, using their creativity or imagination. Also prefers working with self-expressive ideas	**Key skills:** Hard skills: ICT skills, Technical skills, Literacy Soft skills: Creativity, Team working, Intercultural competence, adaptability, willingness to learn, Professional skills: Expressing artistically or physically, communicating by speaking, writing and singing, performing, designing, presenting, planning, composing, playing, dancing.	**Relevant ESCO Occupational sectors/ occupations** Handicraft and Printing Workers/ Teaching Professionals (vocational, secondary, primary school educational teachers, nursery)/ Legal, Social and Cultural Professionals *Indicative occupations: Artist, illustrator, photographer, sign writer, composer, singer, instrument player, composer, dancer, choreographer, actor, reporter, writer, editor, announcers on radio, television and other media advertiser, hairdresser, fashion designer, industrial arts vocation teacher, decorative painter, engraver, jeweler, potter, musical instrument maker, handicraft workers in wood, glass maker, leather goods artisanal worker, translator, graphologist, interpreter, lexicographer, sign language interpreter, linguist*	***New occupations in the context of Industry 4.0*** *Digital Fabrication Technician, Digital Textile Designer, E-book Conversion Specialist, Web-to-Print Coordinator, Augmented Reality (AR) Print Designer, Digital Marketing Manager, Cultural Heritage Digital Curator*

Social			
Description of type:	**Key skills:**	**Relevant ESCO Occupational sectors/ occupations**	***New occupations in the context of Industry 4.0***
Likes to work with people – to inform, enlighten, help, train or cure them, or to help them live up to their potential. Prefers solving problems through discussion. Tends to be helpful and friendly. Usually doesn't prefer to work with things.	Hard skills: Literacy, ICT skills Soft skills: communication, Team working, Intercultural competence, Adaptability, Ethical competence, Willingness to learn, Stress tolerance Indicative Professional skills: Communicating orally or in writing, caring and supporting, training, meeting, greeting, assisting, teaching, informing, interviewing, coaching.	Teaching Professionals (vocational, secondary, primary school educational teachers, nursery)/ Health Professionals/ Legal, Social and Cultural Professionals/ Health Associate Professionals / Legal, Social, Cultural and Related Associate Professionals/ Customer services clerks/ Other Clerical Support Workers/ Personal Service Workers/ Hospitality, Retail and Other Services Managers / Sales and services workers / Personal Care Workers, Protective service workers *Indicative occupations: general practitioner, physiotherapist, primary school and early childhood teacher, vocational education teacher, nurse responsible for general care, social care worker, life coach ,psychologist, social worker, social counselor, journalist, receptionist, human resources assistant, child care worker, waiter, shop sales assistant, police officer*	*Virtual Classroom Facilitator, Data Literacy Educator, Robotics Education Instructor* *Telemedicine Coordinator, Remote Patient Monitoring Technician, Digital Health Coach, Healthcare AI Specialist, EdTech Integration Specialist,Digital Rights Advocate, Social Media Ethicist, Telehealth Coordinator, Digital Health Navigator, Health Technology Trainer, Community Health Worker (Digital), Digital Inclusion Coordinator, Remote Technical Support Agent,Social Media Customer Care Agent, Virtual Personal Trainer, Remote Wellness Coach, Online Mental Health Counselor, Telemedicine Assistant, Digital Beauty Consultant, Virtual Event Coordinator, Online Customer Success Specialist, Telehealth Nurse, Virtual Physical Therapist, Digital Health Assistant, Remote Training and Development Specialist*

Enterprising			
Description of type:	**Key skills:**	**Relevant ESCO Occupational sectors/ occupations**	***New occupations in the context of Industry 4.0***
Mostly likes to work with people- influencing, encouraging, persuading, leading, or managing them for economic gain or for the goals of an organization. Enjoys leadership positions and dislikes details	Hard skills:Literacy, ICT skills, Numerical skills Soft skills: communication, Team working, Ethical competence,Adaptability, Willingness to learn, Stress tolerance, Organisational skills, Entrepreneurial skills, Leadership Indicative Professional skills: Selling, promoting and persuading, developing ideas, public speaking, managing, organising, leading and captaining, computing, planning.	Chief Executives, Senior Officials and Legislators/ Administrative and commercial managers/ Production and Specialized Services Managers Hospitality, Retail and Other Services Managers/ Business and Administration Associate Professionals/ Personal Service Workers Sales and services workers/ *Indicative occupations*: *Senior government official, legislator, salesperson, lawyer, politician, accountant, business owner, hotel or restaurant executive or manager, human resource manager, defense administration officer, corporate social responsibility manager, retail and wholesale trade manager, survey and market research interviewers, travel consultants and clerks, receptionists (general), travel agent, music or sports promoter,*	*Virtual Sales Representative, Digital Transformation Officer (DTO), Chief Data Officer (CDO)Virtual Customer Service Representative, Chief Sustainability Officer (CSO), Remote Operations ManagerRemote Customer Experience Manager, Digital Operations Supervisor, Supply Chain Digitization Manager, E-commerce Platform Manager, Smart Factory DirectorDigital Marketing Manager , E-commerce Operations Manager, Digital Production Manager, Health and Safety Technology Manager, Virtual Experience Manager, Digital Marketing Manager, Online Reputation Manager, Digital Transformation Consultant, Virtual Project Coordinator, Remote Training and Development Specialist, Digital Stylist/Personal Shopper, Remote Sales Consultant, Virtual Customer Success Manager, E-commerce Fulfillment Specialist*

Conventional			
Description of type: Likes to work with data and commonly has numerical or clerical ability. Usually prefers carrying things out in detail or following through on other's instruction. Also prefers structured situations over ambiguous ones.	**Key skills:** Hard skills: ICT skills, Numerical skills Soft skills:Team working, Adaptability, Ethical competence, organisational skills, problem solving Indicative Professional skills: Computing and keyboarding, recording and keeping records, paying attention to detail, meeting and greeting, doing calculations, handling money.	**Relevant ESCO Occupational sectors/ occupations** General and keyboard clerks/ Customer services clerks/ Numerical and material recording clerks/ Other Clerical Support Workers/ Personal Care Workers/ Protective Services Workers/ Legal, Social, Cultural and Related Associate Professionals/ Chief Executives, Senior Officials and Legislators Administrative and commercial managers / Business and Administration Professionals/ Information and communications technicians/ Refuse Workers and Other Elementary Workers/ Science and Engineering Associate Professionals/ Health Associate Professionals *Indicative occupations: Administrative assistant, accountant, budget analyst, business manager secretary, financial analyst, receptionist, general office clerk, administration manager,business analyst, business consultant office worker, librarian, bank clerk, computer operator, stores and dispatch clerk, production clerk, transport clerk, stock clerk, information and communications technology user support technician, computer network and systems technician, web technicians*	***New occupations in the context of Industry 4.0*** *Digital Data Entry Specialist, Virtual Administrative Assistant, Chatbot Operator, Digital Customer Support Agent, Inventory Management Technician, Digital Billing Specialist, Remote Document Controller, Virtual Receptionist, Telemedicine Assistant, Digital Care Coordinator, Cybersecurity Analyst, Digital Forensic Investigator, Data Privacy Specialist, Digital Rights Advocate, Digital Transformation Leader, Chief Digital Officer (CDO), Remote Operations Director, E-commerce Operations Manager, Digital Rights Advocate, Digital Infrastructure Technician, Telecommunications Engineer, Automated Waste Collection Technician, Smart Waste Management Inspector, Automation Technician, Telehealth Coordinator, Cybersecurity Legal Consultant, Virtual Administrative Assistant, Data Entry Technician (Remote), Remote Transcriptionist, Virtual Meeting Coordinator*

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