EPICUR
EUROPEAN UNIVERSITY

REPORT (NEEDS ANALYSIS) ON WORKFORCE SKILLS

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1. EXECUTIVE SUMMARY

Background:

The EPICUR alliance, consisting of nine partner universities, aims to address major societal challenges of our time. One such challenge includes the widening workforce skills gap/mismatch and the issue of reskilling and upskilling. By identifying and analysing, first, the key businesses and industries and, second, the skills and competences that are most needed in their regions, the partners will contribute to addressing the skills needs, establishing connections between the EPICUR regions, producing unique analysis and adding input to the skills intelligence field in general and the European Year of Skills in particular. The report outlines the skills needs analysis and zeroes in on the action points that would address those needs.

The Workforce Skills Needs Report is a milestone (MS32) within the EPICUR SHAPE-IT project, serving as a key resource for the alliance for addressing the issues of skills needs, reskilling and upskilling. It provides an overview of the key businesses and industries, as well as specific skills needed in the EPICUR regions. By focusing on the issue of skills, EPICUR aims to empower the workforce within its regions, foster innovation and entrepreneurship and create deeper connections between universities and businesses and industries. The report positions the EPICUR partners to be at the forefront of addressing the skills needs within their local ecosystems.

Co-Creation Process:

The report was developed through a participative bottom-up process involving all partner universities. A working group was established (and regular meetings were held) to work collaboratively on entrepreneurship and employability tasks 5.3 and 5.5, of which the report is a major part. The partners divided their work into various sections, working on desk research, stakeholder engagement and defining action points over the course of 2023. The resulting report is a product of joint collaborative effort on the part of all EPICUR alliance members.

Key findings:

Through focusing on analysing the workforce skills needs in the EPICUR regions, the partners identified key businesses and industries that are the economic drivers of their respective regions.

This, in turn, was followed by looking at the specific skills and competences needed now and in the near future (with, for example, skills such *as adaptability* and *critical thinking* being a common thread in almost all of the regions). The analysis also resulted in the identification of a number of action points, the implementation of which would contribute to solving the issues of skills mismatch and/or upskilling and reskilling and would position the EPICUR alliance to be of benefit on solving the skills-related issues on the internal (alliance-wide) and external (regional, national, European, etc.) levels. The main findings are the need for **agile skills development**, the need for **strategic partnerships between industry and educational institutions** for skills development and to **nurture the motivation of lifelong learning** for employees as well as employers (especially keeping the small and medium sized enterprises (SMEs) in mind). Finally, the soft, transferable skills are durable and valuable across all fields, whereas hard skills vary according to changes in technology and businesses.

2. INTRODUCTION

This report is a part of the EPICUR SHAPE-IT project's milestone 32 (led by University of Southern Denmark (SDU)), which in it-self is a part of work package 5 – **Building skills with society**. The milestone calls for "*a joint report of business & industry needs for upgrading of skills in the EPICUR regions*".

Assuring relevant and desirable skills has a high focus both on an individual and societal levels. On the individual level, the focus is on developing employability and, thus, career mobility, strengthening the job prospects and lowering the risk of unemployment; and on aligning students and graduates' knowledge

and skills in various educational fields with the future skills demands and helping them prepare for their careers in the labor market. On a societal level, it is pivotal to fill the skills gap to solve some of the greatest challenges of our time regionally, nationally, and globally. Assuring relevant and adequate skills is essential for thriving industries and businesses. Hence, lifelong learning and the (mis)match between needed and existing skills of the workforce are crucial areas of interest for the project partners, their universities and surrounding eco-systems in the effort to address societal challenges and potentials as well as contributing to the well-being of people and society. This is particularly the case because of the (potential) synergies between the members of the EPICUR alliance when it comes to the issues of skills. The partners can and, as shown in the data below, do share overlaps in terms of both similar skills and similar key industries, which enables them to tackle such challenges jointly. This also gives the partners opportunities to share best practices and experiences of tackling the issue of skills and gives cooperate more broadly, including on contributing to the EU's recent focus on skills.

Thus, the key purpose of the report is enhancing and bringing more depth to the workforce skills needs across 7 ecosystems by utilizing the unique vantage point of EPICUR's presence within 7 different regions across Europe. The goal is to gather both existing and new information into a report that will provide guidance on the impact that both EPICUR and other regional, national, and international actors should produce to address those skills needs. Additional impetus for that was provided by the ongoing (at the time of writing) **European Year of Skills**, aimed at putting "skills centre-stage" across Europe[1]. This report is, thus, also a part of EPICUR's contribution to the European Year of Skills.

This report will be of both internal and external use:

Internally (within the EPICUR alliance), the goal is to create a reference point that will direct future project activities in terms of impact, since uncovering the needs should be only a first step that must be followed by addressing them. EPICUR's goal is to educate future game changers and leaders, equipped with the skills and competences to shaping the society sustainably. The findings of

[1] European Union (n.d.). European Year of Skills. https://year-of-skills.europa.eu/index_en

the report are directly linked to the needs of the current work force and the educational gap EPICUR has to address. This report hence serves as a basis for a future EPICUR education strategy and will influence all project work packages linked to education when it comes to skills development for the European labour market.

Externally, the EPICUR universities want to add their contribution to the existing literature on workforce skills needs, because of their unique perspective as partners within a European university alliance. Thus, the hope is that this report can inform policymakers and other relevant stakeholders on regional, national, and international levels and highlight what needs to be done to address the skills-related issues.

The partners recognise that this report is published in an ever-changing environment that particularly affects the relevance (or irrelevance) of certain skills. The impact of, among others, artificial intelligence (AI), digitalisation and automation on jobs and job-related skills can be felt not just in the long run, but in the day-to-day lives of people across Europe. That is why the report aims to capture both short-term needs and long-term trends in relation to business and industry needs, with partners being fully aware that these needs and trends might change at any time in ways that cannot be predicted with absolute certainty.

There is an overwhelming amount of analysis and reports on skills, competence frameworks and survey of the future need for skills and competences. This report builds on the existing knowledge and on new EPICUR specific analyses and will offer a unique specific focus on the regional aspects within the EPICUR alliance.

This report is structured into 5 chapters that contain a varying number of sections. Chapter 2 includes introduction, target groups for the report and a summary of definitions that are relevant for this report. Chapter 3 contains the background and need for closing the skills gap. Chapter 4 describes the methodology applied during the process of preparing this report. Chapter 5

contains the analysis of workforce skills needs across the 7 EPICUR regions. Chapter 6 is focused on describing the actions that should be undertaken in response to the analyses on regional, national, international and EPICUR levels. Chapter 7 summarises the added value of the report's data. Finally, Chapter 8 is the conclusion.

2.1. Target groups

Stemming from the fact that the report is, as described previously, of both internal and external use, there are several target groups for this workforce skills needs report:

Internally (within the EPICUR alliance), the report is produced for the benefit of those involved in work package (WP) 5 – *Building skills with society* – of the EPICUR SHAPE-IT project (i.e., university staff). Since WP 5 is focused on various areas of society-academia collaboration, such as lifelong learning, citizen science and, of particular relevance in the context of this report, employability and entrepreneurship, it is valuable to have a reference point through this report that informs what kind of impact EPICUR's WP 5 activities should have. This will help to keep such activities relevant, especially when their goal is attempting to address skills-related issues. Aside from WP 5, the partners hope that this report will be relevant for other activities and work packages within the project (particularly WPs 2, 4, 6 and 7), since the manyfold issues EPICUR is trying to address are linked and the issue of workforce skills is relevant for all of them. The report could serve as a basis for the future design of EPICUR educational formats / mobilities. This especially concerns the educational strategy, as it is in the process of development.

Externally, the target groups include various stakeholders – higher education institutions (including, but not limited to, the members of the EPICUR alliance), governments (on various levels), businesses and other ecosystem actors and institutions. The goal is to familiarize these target groups with workforce skills needs and inform them of concrete steps that can be taken to address those

them. The report should thus be available and accessible to all stakeholders and disseminated accordingly.

2.2. Definitions

As part of working on this report, the EPICUR partners have zeroed in on various definitions that form a common baseline for their work. The key finding from that process centred around the fact that different universities have different definitions and/or understandings of the concepts listed below. Most of these differences arise from the fact that the 9 universities operate in distinct ecosystems, with differing local and national factors and environments and varied understandings of central concepts relevant to this work. Instead of trying to come up with a singular new definition for a certain concept, the decision was made to embrace this diversity of understandings as a vehicle for knowledge and best practice exchange.

All the partners agreed, however, the operational definitions are, and should be, referencing those used on the international and, particularly, European level. This understanding is at the core of the subsections below.

When analysing skills needs in the business and industries in the EPICUR regions, more definitions need to be in place as well as on what level the needs are present: individual level, company level, industry/business field level, regional level, national level or European level. In the following it is the skills among the **work force population** in the **industries and business** in the regional vicinity of the EPICUR universities that are in focus.

2.2.1. Workforce

The EU definition of workforce is "the labour force or workforce or economically active population, also shortened to active population, includes both employed (employees and self-employed) and unemployed people, but not the

economically inactive, such as pre-school children, school children, students and pensioners"[2].

As such, the EU definition does not divide the workforce population into educational levels but includes members of the workforce through demographic and age-oriented factors. This affects how the nine partner universities operate in collecting inputs on needed skills and competences from stakeholders in the eco-systems including the whole of the workforce and not only, for example, with a focus on highly educated persons or students. Consequently, the workforce focus is related to the relevant areas of business and industry in the regions and thereby it can (and does) differ between the nine universities.

2.2.2. Skills and competences

As part of the foundation for the collection of the needed workforce skills within industries and businesses of the regions (and taking into account the work that the EPICUR alliance has done with EPIQAssess activities and within the context of the EPICommunity), it has been found relevant to define and distinguish between skills, competences and transferable skills as these concepts are often used inconsistently in the literature.

Following the description of EEA (European Education Area)[3], key competences consist of knowledge, skills and attitudes, and, as such, skills are defined as one element among others in the development of competences. In 2018 the Council of the European Union adopted this definition in relation to key competences for lifelong learning. Hence, a key competence is a combination of knowledge, skills and attitudes.[4]

[2] Eurostat (2020). Glossary: Labour force. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Labour_force

[3] European Commission (n.d.). Council recommendation on Key Competences for Lifelong Learning. https://education.ec.europa.eu/focus-topics/improving-quality/key-competences

[4] European Union (2019). Key Competences for Lifelong Learning.

The European Qualifications Framework[5] operates with a definition related to learning outcomes. **Knowledge** is defined as theoretical and factual knowledge through learning. **Skills** refer to the ability to apply knowledge and use know-how to complete tasks and solve problems cognitively and/or practical. **Competences** are not directly mentioned, instead responsibility and autonomy are used to represent a learner's ability to apply knowledge and skills autonomously in a responsible way.

Turning to research on learning theory, the concept of competence is connected to the concept of transfer to distinguish from knowledge and skills. Here, people develop competences when they can transfer and activate knowledge, skills and experiences in meaningful ways in new contexts [6,7].

This relates to the concept of transferable skills that seems to function as a bridge between skills and competences as they are described in the above part of the section:

"There is an agreement that transferable skills describe useful skills to (potentially) act efficiently in different real-life situations. In almost any situation or occupation, people need to have (1) fundamental skills, such as literacy, using numbers and technology, (2) people-related skills, such as communication, interpersonal skills, influencing skills, negotiation skills, teamworking skills, customer service skills or leadership skills, (3) conceptualising/thinking skills, such as managing information, problem-solving and planning, (4) skills related to the business world, such as innovation skills and enterprise skills, and (5) skills related to the community, such as citizenship skills"[8].

The dimension of transfer of learning in relation to the skills concept connects to lifelong learning as another important aspect of the EPICUR SHAPE-IT project. Lifelong learners develop skills and competences throughout life in

[5] Europass (n.d.). Description of the eight EQF levels. https://europa.eu/europass/en/description-eight-eqf-levels

[6] Illeris, K. (2012). Kompetence – hvad, hvorfor, hvordan? Forlaget Samfundslitteratur.

[7] Lightner et. al. (2008). Faculty and Student Attitudes about Transfer of Learning.

[8] Nägele, C. & Stadler, B. (2017). Competence and the Need for Transferable Skills. Springer International Publishing.

various contexts and lifelong learning is said to be one of the most central abilities of our time within the workforce[9].

Thus, extensive work on definitions of skills and competences already exists and it make sense to take a point of departure from these definitions. Central examples of frameworks and concrete skills can be found in the background section and will function as a common starting point in the desk research, in interactions with stakeholders as well as in the analysis.

For each university and region, it is suitable to operate with either the term skills or competences or both depending on traditions and local understandings of the concepts.

Thus, in the following **we will use the term 'skills'**, but it will include also transferable skills and competences as interchangeable terms.

2.2.3. Shortage or skills gap/ skills mismatch

"Skill gap defines a situation when an employer believes that workers do not possess the right type of competencies to perform tasks associated with their job. In contrast skill shortage occur when an employer is unable to fill an advertised vacancy due to the lack of a suitably qualified candidate"[10]. Detecting skill gaps is one of the aims of this report.

3. Background

In an ever faster changing and challenging world with more frequent crises and risks, there is an even higher need for relevant skills to handle the challenges. The risks include a **declining European population** with 13.5 million, or 4 percent at the end of this decade. **The climate crisis** with the **loss of**

[9] EPICUR (2023). EPICUR Lifelong Learning Policy.
[10] ILO Skills Innovation Facility (n.d.). Supplementary notes on skills mismatch. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/transferabledocument/wcms_735524.pdf

biodiversity, extreme weather and lost arable land, **migration**, **pressure on the health systems**, the **digital transformation** and the rapid development of **artificial intelligence (AI), misinformation** and **erosion of social coherence** as well as **pandemics** are other risks that the European societies need to deal with[11]. This requires massive investment in upskilling and reskilling of the workforce.

According to a McKinsey analysis, a lot of the job needs in 2030 will require a higher level of skills[12]. Skills are the key drivers for the digital and green transition and needed to strengthen the economic resilience of the European societies. In five years, 44% of the skills we apply everyday will be different[13].

Agriculture technologies, digital platforms and apps, e-commerce and digital trade, and AI are all expected to result in significant labour-market disruption. The fastest-growing roles relative to their size today are driven by technology, digitalization and sustainability. All these changes will require new skills. This also means, though, that identifying them and defining ways to tackle the related need is key to sustainable development and stable economic growth.

The technological development within **AI** and **automation** is foresighted to decrease the number jobs, with 14 million losses worldwide[14]. However, there is still a shortage of people with relevant skills in the workforce due to an ageing population and increase in demands for skills. This also holds true in Europe, but with regional differences reflected in the EPICUR regions[15]. The regional composition of the workforce (declining/growing population, level of education) and the characteristics of the regional labour markets affect the regional needs for skills. The 9 EPICUR universities are reflecting and impacting

[11] World Economic Forum (2023). Global Risks Report 2023. https://www.weforum.org/publications/global-risks-report-2023/

[12] McKinsey Global Institute (2020). The future of work in Europe. https://www.mckinsey.com/~/media/mckinsey/featured%20insights/future%20of%20organizations/the%20future%20of%20work%20in%20europe/mgi-the-future-of-work-in-europe-discussion-paper.pdf

[13] World Economic Forum (2023). The Future of Jobs Report 2023. 4. Skills outlook. https://www.weforum.org/reports/the-future-of-jobs-report-2023/in-full/4-skills-outlook/

[14] World Economic Forum (2023). The Future of Jobs Report 2023. https://www.weforum.org/publications/the-future-of-jobs-report-2023/

[15] McKinsey & Company (n.d.). Explore the future of work in Europe. https://www.mckinsey.com/featured-insights/future-of-work/explore-the-future-of-work-in-europe?page=/map/regional-cluster/intro

their regional ecosystems of industries through research and innovation as well as through educational offers[16].

The **green transition** will require a range of specialist knowledge and skills. For example, Renewable Energy Engineers, and Solar Energy Installation and System Engineers are relatively fast-growing roles, as economies shift towards renewable energy. As a lot of the energy consumption will be electrified, the demand for electricians, electric engineers, power electronics, etc. will increase.

As seen from Figure 1, there is an issue of varying educational level (and, thus, employability and work preparedness) in the EU. Therefore, there are different baselines for the development of skills.

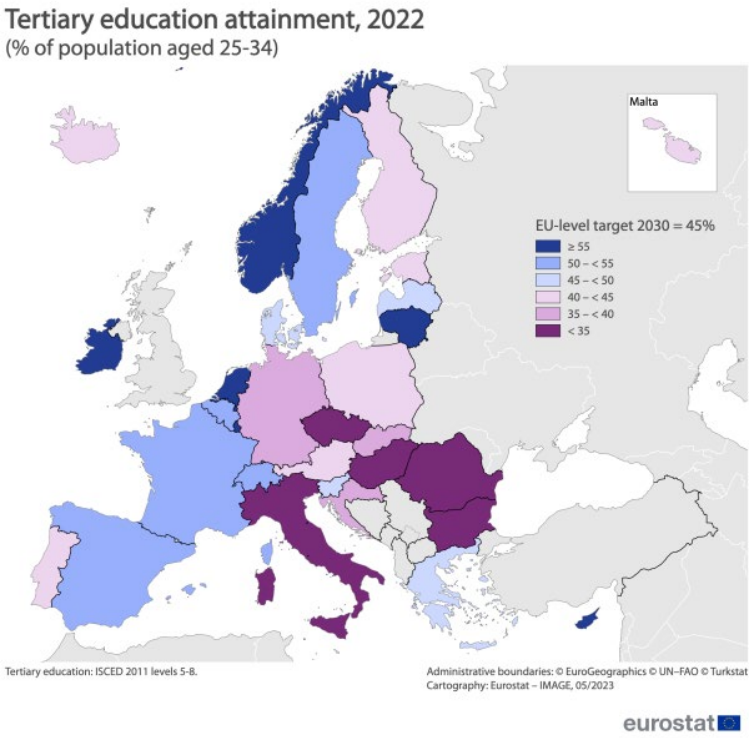


Figure 1: Tertiary education 2022 in Europe

[16] McKinsey Global Institute (2020). The future of work in Europe. https://www.mckinsey.com/~/media/mckinsey/featured%20insights/future%20of%20organizations/the%20future%20of%20work%20in%20europe/mgi-the-future-of-work-in-europe-discussion-paper.pdf

3.1. Existing frameworks of skills and competences

A number of skills and/or competence frameworks have been developed as part of the European effort to describe the needed skills and competences for the workforce to enhance employability and well-being. These align with the definitions and understandings of skills, competences and transferable skills from the definition section.

The European Council has identified 8 **key competences** that are a dynamic mix of knowledge, skills and attitudes that all people need for personal fulfilment and development, employability, social inclusion and active citizenship. The eight key competences are:

- *Literacy competence*
- *Multilingual competence*
- *Mathematical competence and competence in science, technology and engineering*
- *Digital competence*
- *Personal, social and 'learning to learn' competences*
- *Citizenship competence*
- *Entrepreneurship competence*
- *Cultural awareness and expression competence*[17]

Complementing the 8 key competences, the so-called **21st century skills framework** for learning also provides an overview of central concrete skills and more transferable competences that learners in all parts of the educational system need to develop in order to thrive and contribute to society. The model consists of core skills such as *Life & Career Skills, Learning & Innovation Skills, Information and communication technologies (ICT) Skills, foundational literacies and character qualities.*[18]

Additional skills and competence frameworks have been developed zooming in on specific dimensions of the two transferable frameworks. Models such as the

[17] European Commission (n.d.). Council recommendation on Key Competences for Lifelong Learning. https://education.ec.europa.eu/focus-topics/improving-quality/key-competences

[18] Partnership for 21st Century Skills (2019). https://www.mtvt.org/resources/partnership-for-21st-century-skills/

'**EntreComp**', the '**GreenComp**', the '**DigiComp**' and the '**LifeComp**' offer a deeper elaboration of how people can develop themselves within interest areas specifically relevant to their situation and learning situation (See annex, points 9.5 to 9.8, for the frameworks).

Whereas the abovementioned frameworks represent transferable overviews of needed skills at EU or global level, national and regional model have also been developed at university level in the context of the alliance universities. An example of this is the '**Learner for Life' competence model** from the University of Southern Denmark. The model is inspired by the transferable models and is developed to support students, study program and graduates at university level to develop skills and competences relevant to both the national and international labour market. The five competence categories overall correspond with the skills and competences in the other frameworks. Another example is **the Karlsruhe Institute of Technology (KIT) model** - KIT developed a competence model that emphasizes the interdisciplinary skills which are necessary for successful work in addition to the job-specific technical requirements. The three competence fields "Personal competencies", "Interaction competencies" and "Methodological competencies" describe interdisciplinary competencies that are relevant for all KIT employees. The competence field "Leadership competencies" is relevant for tasks in connection with leadership responsibility. The models mentioned above are available in the annex section of this report.

The combination of definitions of skills and competences and the various belonging frameworks will serve as the point of departure in the methodological and analytical approach to examining the need for skills within the workforce in the nine regions.

4. METHODOLOGY

In order to maximize the impact of the report and to define its scope, the partners agreed on and followed a set process of working on the report from the start to its submission for validation.

This process involved a clear definition of the timeframes and responsibility of each partner. As lead milestone partner, SDU began working on the report internally in November 2022, but work intensified considerably in April and May of 2023. This included gathering of preliminary sources and discussing the initial steps and ideas for the report. May 2023 was also the time of the initial report-specific meeting with other partners and, thus, the start of the active working phase across the EPICUR alliance when it comes to this milestone. From that point onwards, all of the EPICUR partners have been kept in the loop on the development of the report and the effort was continuously made to involve all partners to collect the best possible input from 9 different perspectives.

The partners agreed to a stepwise approach of producing the Workforce Skills Needs Report. Essentially, it involved three key elements tackled successively over the course of working on the report from May to November of 2023. The elements are *desk research*, *stakeholder engagement* and definition of *action points*.

In the period of working on the report, the partners had (on average) monthly meetings either as part of the specific Workforce Skills Needs Report-focused task force or within the broader context of WP 5 working group 3 – Entrepreneurship and Employability. This allowed everyone to stay up to date, monitor the progress, and discuss any issues and challenges related to the report. In total, 7 such meetings were held (this excludes any bilateral or internal report-related meetings at any partner university). All partners have been invited to participate in all of these meetings.

In terms of substance, the partners made two key decisions from the start – focusing specifically on the EPICUR regions/ecosystems that correspond to the

regions within the European Commission's Smart Specialisation Platform[19]; and agreeing to have differing approaches to tackling the three key elements of the work on the report (especially in the case of stakeholder engagement), in order to take into account local variations in what would constitute the best approach. This latter point guaranteed the diversity in data, which, the partners agreed, is one of the strengths of this report.

4.1. Desktop research

For the desk research phase of the report, the partners analysed various sources (available in English and in the local languages) that were not older than 5 years old at the time of working on the report, in order to preliminarily identify the key businesses and industries within their regions, as well as to understand the background of skills needs.

This part of the work was the focus largely from the start of working on the report in May 2023 until August – September 2023, with some exceptions.

4.2. Stakeholder engagement

For the stakeholder engagement phase, the partners were encouraged to reach out to key ecosystem business and industry stakeholders identified through the desk research to get first hand data on the skills needs situation in their regions. This allowed the EPICUR partners to collect unique, up-to-date data.

This part of the work was conducted with relative flexibility in terms of how each individual partner approached stakeholder engagement. There was no defined questionnaire or obligatory methods of engagement. The partners wanted to capture the local variations in allowing for a flexible approach – the assumption being, essentially, that each partner would know their local situation best and, therefore, be able to select how to approach the stakeholders and what to ask in

[19] European Commission (n.d.). Smart Specialisation Platform. Registered countries and regions in the S3 Platform. https://s3platform.jrc.ec.europa.eu/where-we-are

their own way. For instance, the University of Haute Alsace (UHA) conducted semi-structured interviews with a set of profiles whose field expertise and diversity represented an added value; SDU gathered representatives from the 8 key industries in the Southern Denmark region for an information-collection event; KIT interviewed its region's key stakeholders individually; and a number of other partners relied on previous surveys and interviews.

The key questions tackled through both desk research and stakeholder engagement, however, include the following:

- What are the key businesses and industries in each region?
- What kind of skills do they need now and expect to need in the near future?
- How can everyone make sure that these skills needs are met?

The work of stakeholder engagement was in planning during the work on desk research and was actively implemented from August – September to October 2023.

4.3. Action points

Upon identifying the businesses and industries, as well as specific skills needed, the partners moved on to defining clear action points. This process involved brainstorming (individually and as a team) based on the needs analysis and summarizing the key relevant ideas through which the data gathered for this report could be put to practical use.

Defining the action points was the key focus of the partners' work on the report from October to November 2023.

5. REGIONAL ANALYSIS

This section of the report includes the analysis of the key businesses and industries in the EPICUR regions. It also zeroes in on what specific skills and competences are needed now and will be needed in the future.

Table 1 shows an overview of the labour markets in the regions of the universities in the EPICUR alliance and summarizes key labour market features in the regions. It is clear that there is a broad diversity of the regions in terms of the labour market, the key industries and the type of region.

Some regions are metropolitan areas with strong economies whereas others are dominated by a more diversified industry landscape. Some are border regions - adding an extra layer of complexity but also opportunities. Common for many of the regions is the dominance of small and medium sized businesses (SMEs) [20].

City and university	**Odense** SDU	**Vienna** BOKU	**Thessaloniki** AUTh	**Poznan** AMU	**Mulhouse/ Strasbourg** UHA/UNISTRA	**Karlsruhe/ Freiburg** KIT/FREIBURG	**Amsterdam** UVA
Region	Southern Denmark	Lower Austria	Central Macedonia, Greece	Greater Poland/ Wielpolska	Alsace	Baden-Württemberg	North Holland/ Amsterdam Metropol area
Population) [21]	1,24 mio (21,2 %)	1,72 mio (18,9 %)	1,80 mio (16,9 %)	3,49 mio (9,2 %)	1,92 mio [22] (2,8 %) [23]	11,07 mio (13.3 %)	2,48 mio (14 %)
Unemployment [24]	4,5 %	4,0 %	14,7 %	2,0 %	6,7 %	3,1 & 2,3 %	3,6 %
GDP PPS [25]	116	143	50	83	95	131/104	168
Region type [26]	Diversified metro and diversified non-metro Border region	Metropol Service based economy	Tourism Havens Educated and emigrating area	Metropol area Service based economy	Metropol area Public based and service-based-economy Border region	Metropol area High tech manufacturing centers Border region	Metropol area Superstar Hub

[20] Eurostat (2022). EU small and medium-sized enterprises: an overview. https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20220627-1

[21] Eurostat (2020). Regions in Europe – Statistics visualized. https://ec.europa.eu/eurostat/cache/digpub/regions_2020

[22] Beckelynck A.-C. (2022) Avec 1 915 915 habitants, l'Alsace continue de voir sa population augmenter. L'Alsace. https://www.lalsace.fr/societe/2022/12/29/avec-1-915-915-habitants-l-alsace-continue-de-voir-sa-population-augmenter

[23] Insee (2023). Demography - Population at the beginning of the month - France (including Mayotte since 2014). https://www.insee.fr/en/statistiques/serie/001641607?idbank=001641607

[24] Eurostat (2023). Regions in Europe – 2023 edition. https://ec.europa.eu/eurostat/web/interactive-publications/regions-2023#labour-market

[25] Eurostat (2023) Regional yearbook 2023. https://ec.europa.eu/statistical-atlas/viewer/?

[26] McKinsey Global Institute (2020). The future of work in Europe. https://www.mckinsey.com/~/media/mckinsey/featured%20insights/future%20of%20organizations/the%20future%20of%20work%20in%20europe/mgi-the-future-of-work-in-europe-discussion-paper.pdf

Key industries	Agriculture/ Food production, Construction Energy & cleantech, Industry production, Logistics & maritime, Robot & drones, Tourism, Welfare/life science technology[27]	Agriculture/wine production Creative industries Digital Technologies Industry & Materials Manufacturing Life Science Mechanical engineering Tourism Sustainable/renewable energy technologies[28]	Agriculture/ Primary sector Constructions Manufacturing Services Trade	Agriculture/ Food production Automotive Construction ICT Logistics & transport Manufacturing. Medical technologies Automotive, Furniture Textiles Service Wholesale and retail trade Wood and furniture[29]	Agriculture/ Food production Aerospace Automotive Banking, Chemistry & plast production Mechanical equipment Life Science & Pharmaceuticals Transportation Tourism[30]	Automotive Aerospace Construction Consumer industry Electrical equipment Financial services ICT IT Mechanical manufacturing Life Science[31]	AI technology Aerospace Creative industries Financial services & Fintech Food production ICT Logistics & transport Life sciences & health Renewable Energy Logistics industries [32]

Table 1: Overview of the labour markets in the regions of the universities in the EPICUR alliance

The regions in Europe are all facing the same challenges and trends: the fast development of technology, AI, and digitalization as well as the green transition. Hence, to ensure relevant and qualified skills is of outmost importance.

Despite the fact that the public sectors' importance in dealing with, for instance, demographic challenges in Europe with an increasingly ageing population and low birth rate, is rising, this report analysis will avoid focusing on the public sector and the required skills and needs there.

This section is divided into parts, each dealing with a specific EPICUR region. Every subsection consists of a short description of the labour market in regard to skills and educational level, an overview of the most predominant industries,

[27] Danmark Erhvervsfremmebestyrelse (2023). Erhvervsfremme i Danmark 2020-2023. https://erhvervsfremmebestyrelsen.dk/sites/default/files/2020-03/Erhvervsfremme-i-Danmark-2020-2023_Strategi.pdf

[28] Vienna Region (2023). The fact and figures in the Vienna Region. https://www.viennaregion.at/vienna-region-facts-and-figures/

[29] Interreg Europe (n.d.). Wielkopolska Region. https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1568130338.pdf

[30] The World of Info (2023). Alsace. https://theworldofinfo.com/alsace/economy/#:~:text=The%20four%20largest%20industrial%20sectors%20are%20mechanical%20equipment%2C,after%20Ile%20de%20France%2C%20in%20terms%20of%20wealth.

[31] Germany Works (n.d.). Baden – Wuerttemberg. https://germanyworks.com/baden-wuerttemberg/

[32] I amsterdam (n.d.). Key Sectors for Business. https://www.iamsterdam.com/en/business/key-sectors-for-business

and the required skills (transversal skills, hard skills and specialised skills needed for the specific industries and businesses in the region), ended by action points to handle the skills gap.

5.1. Skills needs analysis in the region of Southern Denmark

The region of Southern Denmark is characterized by a diversified industry landscape with many production companies mainly SMEs, and only a few larger companies within clean tech. Proximity to Germany and being a border region affects trade and development[33]. SDU has four campuses in the region with the main campus being in Odense.

There are several challenges that are related to workforce and skills needs that are specifically related to the Southern Denmark region. Among those are the facts that many people are employed in low tech areas and possess rather low levels of formal education. Many people with a higher education (HE) degree get employed outside the region[34]. Overall, the region is representative of the national challenges when it comes to the decline of the number of young people willing to live and stay in their native regions.

Specifically in the region of Southern Denmark, a couple of key industrial clusters have been identified:

- Construction
- Food production
- Production industry
- Logistics and maritime
- Energy and clean tech
- Tourism
- Robot and drones

[33] Danmark Erhvervsfremmebestyrelse (2023). Erhvervsfremme i Danmark 2020-2023. https://erhvervsfremmebestyrelsen.dk/sites/default/files/2020-03/Erhvervsfremme-i-Danmark-2020-2023_Strategi.pdf

[34] Ibid.

- Welfare technology[35]

Among the national and regional trends in Denmark, there are clear demographic challenges (similar to the rest of Europe)[36] and a challenge of mismatch between acquired education and needed skills[37]. Every third Danish person in the workforce is either overqualified or underqualified[38], though it is notable that Denmark has a lower rate of low-skilled people compared to other EU countries and that, among adults, the highest risk of being low-skilled is at the ages of 55-64[39]. It is estimated that up to a third of the Danish workforce could be upskilled or reskilled to meet the skills demand[40].

In the future, there will also be a shortage of skilled people in the work force: by 2030, there will be a lack of 78.000 people with vocational training, but a surplus of people with HE/no education. Within the HE, there will be a lack of people within Business & Social Sciences, Engineering, IT and Technology[41]. In 2040, 47% of the Danish workforce in Denmark will have a higher education degree, whereas only 22% will be basic skilled – more and more people with basic/low skills will be outside of the workforce[42].

Six driving forces have been identified as key to the development of business and industry in Denmark: **qualified workforce** and **social inclusion**, **entrepreneurship**, **green and circular economy**, **innovation**, **digitalisation** and **automatisation**, and **internationalisation**[43]. These driving forces are critical for

[35] Ibid.
[36] Ballisager M. et al. (2022). Rekrutteringsanalysen 2022.
[37] Kompetencerådet (2019). Livslang Læring: Fra Slagord Til Realitet. https://fanet.dk/system/files/documents/2021-10/rapport_kompetenceradet_final_21.9.2021.pdf
[38] Boston Consulting Group (2021). Competence mismatch in Denmark and the green transition towards 2030.
[39] Cedefop (2020). Empowering adults through upskilling and reskilling pathways: Vol. 1: adult population with potential for upskilling and reskilling. Luxembourg: Publications Office. Cedefop reference series, No 112. http://data.europa.eu/doi/10.2801/691134
[40] Ibid.
[41] IRIS Group, et al. (2021). Mismatch på det danske arbejdsmarked i 2030. https://ida.dk/media/9067/mismatch-paa-det-danske-arbejdsmarked-2030.pdf
[42] Kompetencerådet (2019). Livslang Læring: Fra Slagord Til Realitet. https://fanet.dk/system/files/documents/2021-10/rapport_kompetenceradet_final_21.9.2021.pdf
[43] Danmark Erhvervsfremmebestyrelse (2023). Erhvervsfremme i Danmark 2020-2023. https://erhvervsfremmebestyrelsen.dk/sites/default/files/2020-03/Erhvervsfremme-i-Danmark-2020-2023_Strategi.pdf

the industries and will have an impact on the skills needed to ensure the development Danish industries and businesses.

In terms of specific skills, the region of Southern Denmark needs people with skills within *collaboration, communication, coordination, marketing, language, resilience, digital and leadership skills, as well as adaptability, entrepreneurial mindset, analytical thinking and consultant competences,* among others[44]. The lack of these skills is reflected in the statistic highlighting unsuccessful hirings in Funen and Sydjylland (the two sub-regions of Southern Denmark) – most unsuccessful recruitments occurred in the spheres of information technology, construction, industry and transport[45]. Analysis conducted from June to November 2022 discovered that there were 120,000 unsuccessful recruitments in Denmark. Half of the recruited people didn't have the right competences for the job[46].

5.1.1. Stakeholder engagement workshop data

In order to expand upon the abovementioned data, SDU organized a stakeholder engagement event on the 11th of October 2023 with representatives of the 8 key industries and businesses in the region of Southern Denmark. The discussions centered around two core topics from the stakeholder perspective – the challenges and opportunities that they face/will face and the skills and competences they need/will need to overcome them.

Climate change and **green transition** are seen by these stakeholders as an overarching challenge that affects all companies across different industries and requires employees at every level to have competences to deal with the issue. Similarly, the stakeholders noted that **demography** will play a major role – with fewer young people (and, thus, not enough workforce to draw qualified employees from), and more elderly people, greater diversity overall and demands for new forms of work and management. Additionally, it has been

[44] Danmarks Erhvervsfremmebestyrelse (n.d.). En arbejdsstyrke til den grønne omstilling i små og mellemstore virksomheder.
[45] STAR (2023). Rekrutteringssurvey. https://star.dk/media/22521/rekrutteringssurvey-marts-2023.pdf
[46] Ibid.

noted that *sustainability and lifelong learning* can create new opportunities for innovation.

A number of other trends that were mentioned can be seen as more industry-specific but are nonetheless valuable to note. Among these are the challenges related to health (focus on well-being and new employees with medical conditions/mental sensitivity), food production (transitioning towards plant-based and fermentation methods), digitalization (opportunities with automation, technological development and AI) and broader change in working patterns (shorter job tenures with less time for skill enhancement). All of these trends influence the need for transferable skills as well as more specialized skills.

Overall, this data creates a picture of many small businesses in the Southern Denmark region lacking necessary knowledge and/or education and dealing with the gap in the workforce between specialists and people with general skills, with only a few being content with the status quo. The transferable and specialized skills sought after in region of Southern Denmark is shown in Table 2.

Transferable skills	Business specialized skills
Citizenship	Automation of all sectors
Commercial understanding and business development	Cyber security (technical knowledge, risk assessment, vulnerability testing)
Creative thinking and ideation	Design and user-friendly interfaces
Critical thinking	Elements of electrification
Cross-cultural cooperation	ESG reporting
Digital proficiency	Integrating systems
Interdisciplinary collaboration	Power to X
Knowledge co-creation	Process technologist e.g., fermentation, food production, bio solutions
Language proficiency	Product development
Management of diversity	Programming
Project management	Prompt engineering
Qualify the use of AI and technology	Software engineering

Table 2: Transferable and business specialized skills in the region of Southern Denmark

Two skills came up in the discussions more frequently than all the rest – *adaptability* and *curiosity*. They, therefore, represent a kind of "meta-skill", as

they encompass other skills and competences mentioned above and are relevant for all the industries concerned.

In the discussion on how to achieve a relevant skilled labor force, the term "*desire to learn*" (Læringslyst in Danish) was also mentioned frequently. The employee must have a motivation and access to relevant formats for obtaining skills. How to ensure this motivation was not addressed.

Comparing the identified skills from the desk research with the inputs on needed transferable skills from the stakeholders, a coherent picture emerges – the stakeholders more or less confirm the types of relevant skills for their organizations. In addition to this, the stakeholders also point to a number of more specialized concrete skills that would benefit the workforce.

5.1.2. Action ideas

The stakeholder analysis led to the following ideas on how to ensure the right skilled people:

- Examination of the relationship between investments in continuing education vs production
- Better understanding why certain professional groups, e.g., craftsmen and individuals with vocational training, do not opt for further education
- Ensuring that state-of-the-art knowledge is integrated into educational programs (for instance, masonry training has remained stagnant without incorporating new knowledge or technology)
- Working with micro credentials to break down traditional educational structures
- A new narrative about the vocational educations is needed
- The apprenticeship system is too traditional and slow in adapting to new technologies within the industries
- The most recent knowledge might not always originate from research but may evolve within companies
- Peer-to-peer teaching and knowledge sharing between businesses and research institutions are vital

Companies must be careful not to have a monotonous focus on specialists: a better balance with generalists should be maintained. Businesses need innovative individuals who can generate fresh ideas and leaders who can inspire change. Emphasis on diversity and gender in hiring, committees, boards, and so on, will continue, as businesses evolve, and organizations change with new leadership and cultures.

On a macro level, recently a substantial reform was decided upon for the Danish educational system with the purpose of increasing the number of students within welfare and vocational areas, and reorganizing the educational landscape of the universities to affect the imbalances [47] .

5.2. Skills needs analysis in the Vienna region/ Lower Austria

Vienna is located in the region of lower Austria, that is predominated by a service-based economy. Most jobs in Lower Austria require a vocational qualification. Overall, the needed level of qualification is rising in all sectors. The University of Natural Resources and Life Sciences (BOKU) is located in Vienna.

The essential personal and social skills in almost all sectors in Lower Austria include, for example, *strong communication skills, customer focus, flexibility, ability to handle stress, a willingness to learn, intercultural skills (working in international teams)* and *language skills*[48].

Specific skills like *expertise in operating systems, use of computer systems, business management, energy and process engineering, quality management* are required within the technical/engineering fields of electronics, telecommunications, information technology and machine/automotive/metal sectors. In the

[47] Uddannelses – og Forskningsministeriet (2023). Reform af universitetsuddannelserne i Danmark.
[48] EURES (2023). Labour market information: Austria. https://eures.europa.eu/living-and-working/labour-market-information/labour-market-information-austria_en

construction and timber sector, expertise in the areas of *building renovation, waste management and waste disposal* are advantageous, as are specific *IT skills*. For the office, business, financial and legal sectors, additional technical knowledge is beneficial, as are *business management, SAP and e-business skills*[49].

In Austria, 87% of almost 4,000 companies surveyed stated that they are currently affected by the shortage of skilled workers[50]. The shortage of skilled workers is experienced particularly intensively in tourism (81% very or rather severely), in construction (81%) and in the manufacture of wood products (76%), as well as in the artisanal and technical sector as a whole and in transportation and logistics.

In Vienna, 67 % of all companies' state that they are very strongly or rather strongly affected by a shortage of skilled workers, likely to increase in the future[51]. When asked about the causes of the shortage of skilled workers, almost 90% name the lack of professionally suitable applicants as the main cause. Furthermore, 80% generally see a great need for skilled workers in the Vienna region, and this applies to all sectors for which it is particularly difficult for the companies surveyed to find suitable employees at the time of the survey, in Vienna especially in crafts, technical professions and the ICT sector. The shortage of people in Vienna and Austria according to professions are found in Figure 2.

[49] Ibid.

[50] ReferNet Austria; Cedefop (2022). Austria: company survey confirms severe shortage of skilled workers. National news on VET. https://www.cedefop.europa.eu/en/news/austria-company-survey-confirms-severe-shortage-skilled-workers

[51] Institut für Bildungsforschung der Wirtschaft (2022). Company Survey on Skilled Worker Needs/ Shortage.

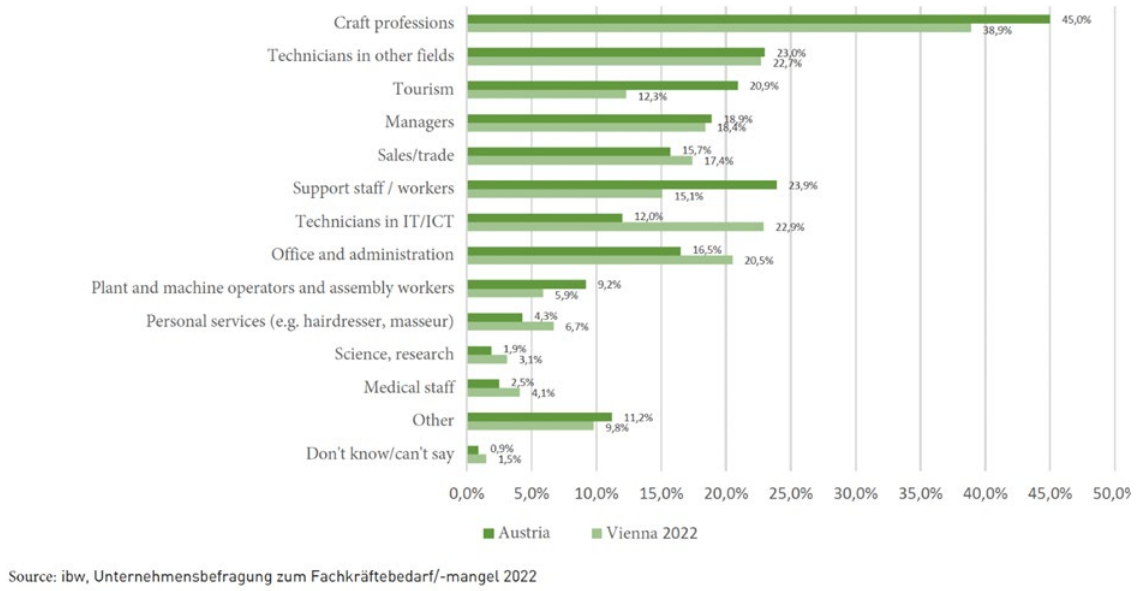


Figure 2: Shortage of people based on profession and sectors in Austria.

Among newly graduates and graduates from BOKU, the skills required are mainly within the transferable skills especially for the newly graduates. For doctoral graduates, the requirement to *develop new ideas* seems to be the greatest challenge. The skills are presented in Table 3.

Skills required for newly graduates	Skills required after 1.5 years of graduation
Adaptability	Application of theoretical knowledge in practice
Assess relevance of information	Communication skills (express oneself adequately orally)
Plan and organize	Decision making
Recognize connections	Mastery of one's own subject
Work independently	

Table 3: Skills required for newly graduated as well as 1.5 years after graduation. Survey conducted among BOKU alumni

The identified graduate skills support to some extent the abovementioned skills for the sectors in general, with only small variations.

5.2.1. Action ideas

The Vienna Chamber of Commerce has analysed the shortage of skilled workers in Vienna and developed a 4-pillar model (Apprenticeship and education,

Immigration, Using existing potential, Education and schooling offensive) that promises a solution to the urgent problem of the shortage of skilled workers. Only actions concerning universities were included in the summary below.

Pillar 1: Apprenticeship and education

- Apprenticeship scholarship for adults
- Qualification of skilled workers through adult education
- Apprenticeship qualification entitles to relevant access to higher education

Pillar 4: Education and schooling offensive

- Compulsory education instead of compulsory schooling
- Making teaching times and forms more flexible (at vocational schools)
- Modernisation and expansion of school locations

5.3. Skills needs analysis in the Region of Central Macedonia, Greece

The region of Central Macedonia is located in the northern part of Greece and consists of the Regional Units of Imathia, Thessaloniki, Kilkis, Pella, Pieria, Serres and Chalkidiki. Most of the enterprises are in the Regional Unit of Thessaloniki, where the highest numbers of vacancies are for office workers, personal service workers, salespersons and related workers, laborers in mining, construction, manufacturing and transport, sales specialists, stockbrokers, real estate agents, persons employed in the service of businesses in general, drivers and mobile plant operators, teachers, travelling salespersons, domestic workers, customer service agents and related workers, etc.[52] The Aristotle University of Thessaloniki (AUTh) is located in the region.

[52] EURES (2023). Labour market information: Greece. https://eures.europa.eu/living-and-working/labour-market-information/labour-market-information-greece_en

The market of the region is mainly focused on economic sector of services and trade, with manufacturing following[53].

29% of businesses in the region declare at least one job vacancy, mainly in the Construction and Manufacturing sectors. Almost 3 in 10 businesses in the region are currently looking for workers and salespeople (29%), and unskilled workers and manual workers (29%). Demand for skilled land workers (farmers, breeders, etc. – 1%) but also for senior management and administrative staff (2%) is very low. The main reasons for not filling positions are the lack of people with the appropriate skills, abilities and experience (36%) as well as the lack of people interested in doing this type of work (36%). Moreover, 12% of employers are unable to identify precisely or do not wish to discuss the reasons for unfilled vacancies. Some positions have recently become vacant or are expected to be filled through the Public Employment Service.

Almost 37% of businesses in the region estimate that new jobs will be created due to expansion of their activities, while 10% estimate that there will be job vacancies as a result of retirements. 89% of businesses state that they intend to cover them. Salespeople are in greater demand, followed by Professionals (financial studies, sales consultants, marketing and engineers) and Office Workers. The following are also considered important: business and administration assistants, operators in industrial plants, machinery and equipment, and unskilled workers - manual workers.

Knowledge of the English language, *Basic digital skills* and Communication & Social skills (see Figure 3) are the most important skills for work in the region. 26% in the answer "none of the above" leads to the conclusion that employers are primarily concerned about specific professional knowledge and skills rather than other individual skills.

[53] According to the data from the Observatory-Mechanism for «Diagnosing the labor market needs of the Region of Central Macedonia» (quantitative and qualitative primary research conducted in May 2023)

Key findings from qualitative research include the following:

- Strong demand for digital knowledge and skills (*digital marketing, data analyst and digital technologies*)
- High demand for technical professions, electricians, refrigerators, maintenance workers, and mechanics. Need of *language skills* (specifically English)

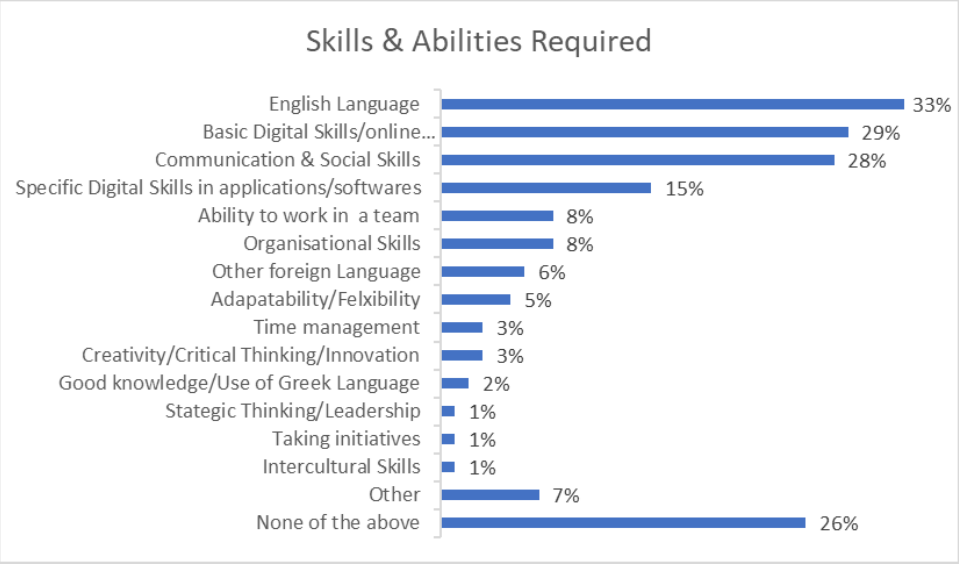


Figure 3: Skills and abilities most in need in the region of Central Macedonia, Greece.

5.3.1. Action ideas

According to the qualitative research, more dilemmas was observed as one in two enterprises believes that there is a lack of skills and knowledge among employees due to a lack of practical training to gain knowledge, which in turn could be due to a lack of interest on the part of enterprises in training their staff and a refusal/lack of interest in specialization on the part of employees. Employees are more likely to look for 'easy' work. Finally, around 10% of enterprises (mainly in manufacturing and construction) integrate temporary workers (mainly unskilled workers) into their production process.

This, in turn, calls for the following proposals:

- Increase training programmes in all regional units
- Develop training for managers and workers, particularly in technical professions
- Need to record the number of temporary staff's overtime

5.4. Skills needs analysis in the region of Greater Poland (Wielkopolskie)

Poznań is located in the region of Greater Poland and is characterized by being a metropolitan area with a service-based economy and is a fast-growing region in Poland[54]. The Adam -Mickiewicz University of Poznań (AMU) is located in the region.

Businesses operating in the region mainly concentrate around Poznań and in the Poznań agglomeration. The dominant industries in the number of companies are:

- Wholesale and retail trade
- Construction
- Professional, scientific, technical activities
- Manufacturing

The modern services sector is proliferating, generating more and more jobs, especially for young people. In 2021, the industry created more than 3,000 new jobs, reporting demand mainly for **programmers, data engineers**, and **AI specialists**. The most sought-after competencies are in the areas *of artificial intelligence development, cloud computing, and analytics*[55].

[54] Dabrowski, M. and Allain-Dupre, D. (2012). Public Investment across Levels of Government: The Case of Wielkopolska, Poland. https://www.oecd.org/cfe/regionaldevelopment/Wielkopolskie_edited.pdf

[55] Ibid.

It can be assumed that in the coming years, the Wielkopolska labor market will be shaped and challenged both by global and European trends and by the local demographic and social situation like the rest of the European Union. The "Occupations Barometer" report shows that 36 shortage occupations were observed in the Wielkopolska region in 2023 and includes, for example, specialists in electronics, automation, and robotics; paramedics and warehousemen; accounting and bookkeeping workers, chefs, industrial workers and craftsman, machine and equipment operators, manual workers, and uniformed services workers[56].

The competencies most often required among specialists in the region are presented in Table 4.

Transferable skills	Business specialized skills
Adaptability	AI
Analytical and critical thinking	Automation
Collaboration	Business understanding
Communication skills	Commercial understanding
Coordination	Knowledge of industry area
Creativity	Legislation
Empathy	Marketing
Entrepreneurial mindset	Sales
IT literacy	Software engineering
Language proficiency	User-friendly design
Leadership skills	
Learning	
Pro-activity	
Problem solving	
Relational management	
Resilience	
Teamwork	

Table 4: Transferable and business specialized skills in Wielkopolskie region

In response to the shortage of skilled workers in various sectors of the labor market, employers in Greater Poland have turned to hiring foreigners. Currently, employers are grappling with a scarcity of skilled workers across

[56] Ibid.

different industries. They are actively seeking individuals with engineering and technical expertise, as well as employees who possess specified soft skills.

AMU regularly conducts workforce skills analyses in collaboration with its partners. Across the majority of its 20 faculties, there are established employer councils that actively contribute by providing valuable suggestions on study programs and expressing their specific needs. Additionally, through internships, employers and partners have the opportunity to provide feedback on the skills and competencies of AMU students, ensuring alignment with the demands of the labor market. According to faculties' reports, the skills listed in Table 5 were pointed out as crucial.

Transferable skills	Business specialized skills
Adaptability to flexible work structures	Applied technology
Applying theoretical knowledge practically	DevOps
Assessing relevant information	Data analysis specialist
Collaboration	Deep learning specialist
Communication skills	Handling local climate change
Communication: Expressing oneself orally with clarity and concise writing	Low-code developer
Decision making	Programming (Java, Python)
Independence	
Initiating projects	
Planning and organizing	
Self-reliance	

Table 5: Crucial skills according to AMU's data

Employers point to even greater importance of *flexibility competencies*, as many professions are changing in the coming years and new professions are emerging, as well as *interdisciplinarity*, developing transversal competences.

As such, the identified specialist skills and the transferable skills from Table 5 complement each other by focusing on many of the same types of skills needed to contribute to the job market.

5.4.1. Action ideas

The employees have not been aware of the necessity of lifelong learning and expanding competences. It is an important priority to create this awareness due

to the development of technology and AI. Furthermore, linking the labor market with offers in non-formal and informal education is a way to close the skills gap. In preparing human resources for the labor market, solutions such as market qualifications, micro credentials, and competencies acquired through the Open Budges standard will become particularly important.

In this context, cooperation between industry, business, and education is becoming necessary, including designing solutions related to the recognition of qualifications acquired outside the formal education system.

5.5. Skills needs analysis in the region of Alsace

Alsace[57] is part of the Trinational Upper Rhine Metropolitan Region[58], and also the Grand Est region[59]. Grand Est is one of Europe's most prosperous regions, with 6.2 million inhabitants and a significant economic powerhouse, with a GDP of 45.5 k€ per capita (1.2 times the average for France and Germany). A land of entrepreneurs, Grand Est boasts more than 94,000 businesses in commerce, industry and services, and 550,000 employees in the commercial sector, including 116,000 in industry. 12,100 new businesses were created in 2021[60], testifying to the vitality of the local entrepreneurial spirit. The Alsace region has the specific traits of a border region and Germany accounts for more than a

[57] From January 1st, 2021, the departmental councils of Bas-Rhin [*area including Strasbourg*] and Haut-Rhin [*area including Mulhouse and Colmar*] constitute the Collectivité européenne d'Alsace.
Alsace (n.d.). Ma collectivité. https://www.alsace.eu/la-collectivite/

[58] "The Franco-Germano-Swiss Tri-national Metropolitan Region of the Upper Rhine brings together the former French region of Alsace, the western portion of the German state of Baden-Württemberg, the southern portion of the German state of Rhineland Palatinate and the Swiss Cantons of Basel-Stadt, Basel-Landschaft, Solothurn, Jura and Aargau."
MOT (n.d.) Tri-national Metropolitan Region of the Upper Rhine. http://www.espaces-transfrontaliers.org/en/resources/territories/territory-factsheets/territories/territory/show/region-metropolitaine-trinationale-du-rhin-superieur/

[59] "From Strasbourg in the East to Nogent-sur-Seine in the West, the Grand Est region covers 57,441 km². It comprises 10 administrative departments: Ardennes, Aube, Collectivité européenne d'Alsace (Haut-Rhin and Bas-Rhin), Haute-Marne, Marne, Meurthe-et-Moselle, Meuse, Moselle, Vosges. The region has a population of 5,556,219, or 8.3% of the French total. Fundamentally European, the Grand Est region is the only one in France to border 4 countries: Germany, Belgium, Luxembourg and Switzerland."
Grand Est (n.d.). Presentation du territoire. https://www.grandest.fr/decouvrir-richesses/presentation/

[60] Figure to be qualified due to the incentive to businesses creation in the scope of the COVID crisis

quarter of the exports from the region[61]. The [wider] Grand Est region accounts for over 20% of trade between France and Switzerland and is home to 10% of the 200,000 Swiss nationals living in France. Haut-Rhin is home to some 40,000 cross-border workers in the neighbouring canton of Basel."[62] The University of Strasbourg (Unistra) and the University of Haute Alsace (UHA) are located in the Alsace region.

Within the context of areas encompassing Alsace[63], the issues related to skills and competencies have been the focus of several studies in recent years. Among these regional trends, several high-pressure occupations, for which employers are struggling to recruit, can be noted.

In 2023, more than a quarter of firms in the Grand Est region[64] were looking to hire and it is in Alsace[65] that recruitment intentions are the highest. In 2019, the six professions with the highest number of vacancies, representing 90,000 positions, were in industry and construction[66].

5.5.1. Stakeholder engagement data

After the desk research, UHA reached out to key ecosystem business and industry stakeholders to get first-hand data on the skills needs situation in their regions. Before getting into the specific needs of the job market in our geographical area, a distinction was set between Strasbourg, on the one hand, a city with executive professionals (high intensity in terms of skillsets) as well as a prefecture; and Mulhouse, on the other hand, a city with a classic industrial

[61] Chamber of Commerce & Industry Alsace Eurométropole (2022). Alsace: les chiffres-clés. https://www.alsace-eurometropole.cci.fr/ma-cci/zoom-sur-la-cci/alsace-les-chiffres-cles

[62] Donas, C. (2022). L'ambassadeur de Suisse enfourche son vélo pour rencontrer les partenaires alsaciens. Les Echos. https://www.lesechos.fr/pme-regions/grand-est/lambassadeur-de-suisse-enfourche-son-velo-pour-rencontrer-les-partenaires-alsaciens-1866235

[63] The sources are sometimes addressing Alsace, or a wider area including Alsace, or a segment of Alsace

[64] Grand Est (n.d.). Presentation du territoire. https://www.grandest.fr/decouvrir-richesses/presentation/

[65] Alsace (n.d.). Ma collectivite. https://www.alsace.eu/la-collectivite/

[66] Rousseau, L. & Manné, I. (2022). High-tension occupations in the Grand Est: recruitment more often under stable contracts. https://www.insee.fr/fr/statistiques/6676448

environment, with a workers' labor force that has trouble renewing itself. Still, the future skills needs are very similar to those elsewhere in France.

Several trends were identified during the discussions, such as the increased demand for **low-qualification caring jobs, computer specialists**, as well as the growth of **thermal renovation in construction**. It was noted that with a University Bachelor of Technology (BUT), Bachelor's, or Master's degree, applicants get a job easily. The main problem in the region is that there are too few profiles corresponding to those them. Many of them either cross the border to work in Switzerland, or are inclined to leave the Upper Rhine region elsewhere. There will probably be fewer and fewer opportunities for low-skilled employees. There is thus a challenge in increasing the skill level of the regional workforce; otherwise, there are major difficulties ahead.

Since the Covid pandemic, there has been a reversion of the job market in France with various trends at stake:

- The "Great Resignation"[67] is a phenomenon triggered by the pandemic
- Demography, since the population is aging
- Junior professionals intend not to work in the same manner as beforehand with concerns in terms of sustainability, impact, and ethical issues

A defining element brought up was that Covid triggered in-depth and allegedly irreversible changes in management patterns and in the reinforced relationship to work. One of our internal experts noted that firms have found it difficult to get people back on site after the pandemic: priorities are no longer the same, which means that staffs are no longer motivated in the same way; there is a significant resignation phenomenon, and more spontaneous behaviour in terms of decision-making while considering career evolutions, which human resources departments must learn to manage.

[67] myRHline (2022). Que'st-ce que la "Grande Demission"? https://myrhline.com/type-article/tendances-rh/quest-ce-que-la-grande-demission/

A shift toward more horizontal organizations of work has also been observed. Management is not about directing a team any longer, but rather coordinating. As a result, new *transversal skills* are needed in order to deal with these situations. Indeed, one of the interviewed stakeholders stressed that, when considering the ante-Covid period in contrast to the post-Covid timeframe, while there have been no real changes in the need for technical skills in the industrial sector, they have observed a shift regarding the need for *soft skills* in order to address a modified relationship to work. From another perspective, changing trends in workforce skills requirements are not linked to Covid, except for the consequences of relocation plans: energy independence. While this was seriously discussed during a period, an expert stressed a resurgence of the primarily down-to-earth market economy logic favouring the most financially attractive offer, to the detriment of considerations prioritizing national production, which we might have thought would prevail in response to the pandemic.

The major geopolitical uncertainties and technological advances are also creating new jobs that require new skills, such as *life cycle analysis, river renaturation, risk management, crisis communication, and logistics of both materials and information flow*. Furthermore, a new component is that geopolitical paradigms come into play as well as ethical considerations when it comes to practices of sub-contracted firms and in the health care sector, for instance.

As for the way ahead, digital and numeric sectors are growing. **Data flow management and processing, AI, and cybersecurity** are expanding. **Digitalisation** is influencing firms cross-cuttingly, including administrative positions. Meanwhile, expectations are growing, and firms are digitalizing. An expert mentioned that firms generally prefer recruiting new staffs with a certain skillset rather than upskilling existing profiles.

As for the border location of this area, an expert noted that the problem is not as important as one may think. It is a fact, yet, that the students graduating from UHA's engineering schools are less likely to stay in the region, as noticed during the desk research thanks to the study on the territorial impact of UHA led by the Mulhouse Region Urbanism Agency (AURM, now AFUT). For another

interviewed profile, Alsace's border situation is an impediment although there has been a slowdown in cross-border employment due to a loss of language skills. *Linguistic skillset* requirements turn out to impede the French workforce since a significant segment of Swiss firms involved in cross-border employment are SMEs, which implies working in the local language. Ten years ago, there used to be in Switzerland more French cross-border workers than Germans. It has to be noted that countermeasures are underway to tackle this linguistic hindrance, as illustrated by bilingual primary and secondary school programs and the tri-national curricula at the university level. While discussing the effects according to age group, it turns out that some French firms hire back former cross-border workers, even though they offer lower salaries.

The pandemic threw a harsh light on the staffing needs on the French side of the border in the health sector. Indeed, an increasing trend since the pandemic outlined by an interviewee is the movement of the French workforce to Switzerland in this particular sector. This is illustrative of the complexity of harnessing the assets of the cross-border context without being hindered by differences in terms of realities between the job markets on both sides of the border.

5.5.2. Action ideas

The lack of relevant skilled people has been a problem over the years, and some skills related to a specific range of jobs are hard to find. It seems that no swift solution could be found to respond to the whole scope of these challenges.

To turn the workforce skillsets into tailor-made solutions for the employers' needs, various initiatives have been conducted in the Alsace area or are still underway, such as:

Skills recognition across the border: "The Springboard on the Rhine / *Tremplin sur le Rhin*" project aims to adapt skills for professional mobility across the Strasbourg-Ortenau border. To ensure that a candidate from Strasbourg with a French professional qualification can swiftly work across the Rhine, the project partners plan to recognize the skills acquired in France, and to top them up with

the skills missing from the German reference qualification. Hence, they will develop flexible, tailor-made training modules for Ortenau firms in manpower need. The aim will be to demonstrate through several pilot projects that skills acquired in vocational training on one side of the Rhine need to be recognized and valued on the other.[68]

In-company skills acquisition: "*Parcours d'acquisition de compétences en entreprise* - PACE" is an internship placement in a company, enabling the trainee to acquire professional skills, follow-up by a training organization to help him/her make the most of the skills acquired during this experience. The participants are financed through a flat-rate monthly grant depending on your status (young person under 29 or jobseeker)"[69].

Strategic partnerships between universities and industry: The Unistra and UHA universities, with eleven campuses throughout the region, play a key role in the regional landscape. In 2020, 119 research contracts were signed at UHA with 65 partner firms[70]. This dynamism enables both students and the business sector to gain first-hand insights into the skills needs and offer of each other, hence benefiting both sides. These experiences are a way to propose tailor-made learning outputs, hence ensuring that the profiles looking for a job meet a need expressed by employers.

5.6. Skills needs analysis in the Middle Upper Rhine Region/ Baden-Würtemberg

The Middle Upper Rhine region (Karlsruhe and the surrounding areas) is located in the German state of Baden-Würtemberg. Due to the region's geographical situation in immediate proximity to the federal state of

[68] Interreg (2020). Skills adaptation for cross-border professional mobility Strasbourg-Ortenau. https://www.interreg-rhin-sup.eu/projet/tremplin-sur-le-rhin-adaptation-des-competences-pour-une-mobilite-professionnelle-transfrontaliere-strasbourg-ortenau/

[69] Grand Est (n.d.). The Skills Acquisition Pathway (PACE). https://www.grandest.fr/vos-aides-regionales/parcours-acquisition-competences-entreprise-pace/

[70] Agence d'Urbanisme de la Région de Mulhouse (n.d.). Estimating the territorial impacts of the Université de Haute Alsace. https://www.uha.fr/fr/formation-1/orientation-decouverte-des-formations-1/les-news-du-sup/estimation-des-impacts-territoriaux-de-l-universite-de-haute-alsace.html

Rhineland-Palatinate and the French Department of Bas-Rhin, some of the local cluster initiatives are operating on a cross-border basis[71]:

- Information and communication technologies
- Nanotechnologies
- Automotive
- Energy and mobility sector
- Cultural and creative industries

The region is characterized by a huge network of universities, research institutes and high-tech enterprises which leads to an excellent density of scientific competence. The Karlsruhe Institute of Technology (KIT) is present in this region.

Compared to the state of Baden-Wuerttemberg as a whole, the economy of the Middle Upper Rhine region is rather characterized by business activities in the services sector (68.55% share of employment), whereas manufacturing plays a less significant role (31.2%)[72].

Most important industries of the region include:

- Automobile construction including suppliers
- Production of electrical equipment
- Information technology services
- Mechanical engineering

German companies report a shortage of qualified workers. In a Civey survey[73] of 7,500 corporate decision-makers, two-thirds (66 percent) said they were currently experiencing shortages of skilled workers. In the Skilled Migration Monitor of the Bertelsmann Stiftung from the end of 2020, slightly more than

[71] Clusterportal Baden-Wuerttemberg (n.d.). Middle Upper Rhine. https://www.clusterportal-bw.de/en/regions/regions-detail/mittlerer-oberrhein/clusterdb/Region/show/

[72] Ibid.

[73] Bertelsmann Stiftung (2021). Fachkräftemangel in deutschen Unternehmen größer als erwartet. https://www.bertelsmann-stiftung.de/en/themen/aktuelle-meldungen/2021/november/fachkraeftemangel-in-deutschen-unternehmen-groesser-als-erwartet

half of the companies surveyed (55 percent) had expressed the expectation that they would be short of staff this year.

The lack of skilled workers is also one of the biggest challenges for companies in the Middle Upper Rhine Region. In order to recruit and retain suitable personnel, the Chamber of Industry and Commerce (IHK) supports industry partners in various ways to meet their need for skilled workers in the long term. For example, when it comes to increasing employer attractiveness, qualification or skilled workers from abroad.

Many companies in the region are still lagging behind, especially in the fields **Digitalisation, Data and AI.** There is often a lack of competencies and skills among the company's employees, while a new hire is not a solution, for example, due to a shortage of skilled workers. The professional requirements for specialists in all sectors will change enormously in the next few years due to increasing demands and complexity which requires a set of so-called future skills.

5.6.1. Stakeholder engagement data

When it comes to stakeholder engagement conducted in the form of interviews, the key stakeholders for the input of the KIT are the Karlsruhe Technology Region (TRK) which is an action group made up of businesses, chambers of commerce and industry, scientific institutions and public authorities, the Chamber of Commerce and Industry Karlsruhe (IHK), a customer-oriented, self-governing body of the business community, representing the general interest of its member companies and KIT's department Human Resources Development and Vocational Training (PEBA). All three stakeholders have in common that they are well-connected with industrial companies in the region and have a good understanding of employers' needs.

Now, traditional soft skills such as *problem-solving competence, self-organisation and self-reliance* are still relevant in many professions. In addition, high affinity for *digitalisation* and *digital work* is required as remote and paperless working is

becoming more and more common. Further skills that the workforce should have nowadays are for example the ability for *agile working* (a new way of working which differs from the old structures, for example higher flexibility, thinking in smaller steps, etc.) as well as the *ability for project-related work* with various internal and external, partly international, project partners beside of the traditional way of *working in core teams*.

From the interviews with the stakeholders, it can be assumed that the competencies listed in Table 6 will be necessary as future skills in the coming years.

Transferable skills
Dealing constructively with criticism
Empathy
Flexibility and adaptability
Handling AI
Innovation and creativity
Interdisciplinarity
Learning ability and openness for lifelong learning
Relation competences

Table 6: Necessary transferable skills

The stakeholders perceive shortages of skilled workers in both academic and skilled (traditional) craft occupations. On the one hand, workers need to adapt to innovation and technological developments. For example, it will be necessary in the future for mechanics for combustion engines to undergo further training to be able to work with battery-powered engines. Craft skills are still necessary, but new technologies also bring new process controls, such as for production and assembly line work. On the other hand, companies need good human resources development (ideally, it should be a separate department within the company) to offer individual training opportunities for their employees so that they can acquire the skills needed in the coming years.

Comparing the desk research and the stakeholder analysis shows that each perspective supports the digitalization agenda as well as points to a set of more general skills that the workforce needs to develop.

5.6.2. Action ideas

Companies can make use of continuing education opportunities to offer their employees appropriate reskilling and upskilling options.

Close cooperation between the human resources departments and the managers is necessary to recognize which competencies an employee does not yet possess.

Larger companies are aware of the changes and the need for vocational training, and are responding to this by advertising training opportunities as a benefit of working in their companies. For smaller companies, however, this is rather problematic due to the time-cost ratio (e.g., who will take over the day-to-day business during the work stoppage when an employee attends a vocational training), while employees of larger companies are already overtrained through a huge number of internal offerings.

5.7. Skills needs analysis in the Amsterdam Metropolitan Area

The Amsterdam Metropolitan Area (AMA) is comprised of 30 municipalities and two provinces (North Holland and Flevoland). Around 2.5 million people – more than 14 % of the Dutch population – live within the AMA. It is the country's most robust economic region, and the AMA also performs well on the international stage. However, there are labor market differences between the subregions partly due to differences in background characteristics of the residents[74]. The region boasts two airports, seaports, the financial centre of the Netherlands, the world's largest flower auction in Aalsmeer, Media Valley and clusters of creative companies. It is also one of the most important social hubs in the country and a growth engine for the national economy. University of Amsterdam (UvA) is located in the region.

[74] Metropolregio Amsterdam (2023). Economische Verkenningen. https://www.metropoolregioamsterdam.nl/economische-verkenningen-metropoolregio-amsterdam-evmra/

Most of the 90 newly arrived companies are involved in ICT & tech, financial services & fintech, transport & logistics, the creative industry, or the life sciences & health sector.

In the AMA region, the main demand for skills is highest for software skills/developers. The most vacancies are in the *Business economics professions/commercial professions, ICT and Technology professions*[75].

In order to improve the connection between education and the labour market within the AMA, insight into the trends and developments on the labour market and into the (dis)balance or (mis)match between education, labour supply and labour demand is important. By identifying bottlenecks, policy can be developed and implemented more quickly and effectively. The Top Institute for Evidence Based Education Research (TIER) of the University of Amsterdam (UvA) has developed a tracking system for this purpose since 2013. This annual Monitor maps various dimensions of the (dis)balance between education, labour supply and labour demand and identifies which subgroups are mismatched. The research "skills monitor 2020" focuses on all persons registered as living in the AMA in Q4 2016 and Q4 2018, respectively. The skills-based on the ESCO terminology, of AMA residents were further mapped based on the Labour Force Survey[76] (EBB).

The analysis led to a distribution of key skills by age. Three age categories are distinguished: 15-26 years, 27-54 years, and 55 years and older. The four most important main skills in the age distribution are: thinking and decision-making level, social interaction, points of view and values and application of knowledge. The differences in main skills by age may not be as great as thought. Younger and older workers are not in jobs that require very different skills. This suggests a high degree of consistency in skill use across the life course.

[75] 'Key Figures Vacancy Market' shows Q2 2023 Amsterdam Metropolitan Area (AMA) skills most needed in the AMA labour market. Based on the UWV (Employee Insurance Agency), which is commissioned by the Ministry of Social Affairs and Employment to provide labour market and data services.

[76] UWV (2023). Dashboard on labour market and vacancies. www.werk.nl/arbeidsmarktinformatie/dashboards/spanningsindicator

5.7.1. Action ideas

An example of skills-oriented action, aimed at realising a skills-oriented education and labour market in the AMA is a programme called "House of Skills"[77] [78], which is a public-private partnership[79]. The various projects within are associated with various partners and the programme has over 150 skills partners. The House of Skills has experimented with recruitment, assessment, education and matching based on skills by developing innovative approaches for development and career guidance based on skills.

Its goals were to realise skills-oriented education and labour market in the AMA and a provided testing ground for reforming the education and labour market for the Netherlands.

5.8. Summary of the analysis section

The regional analyses indicated a strong emphasis on digital skills (including handling AI) and technical skills needed for the green transition. For all regions adaptability was a key skill reflecting the rapid change in technology and the need for a workforce that can quickly adjust to an everchanging work environment.

Apart from the specialised and hard skills, there was also a clear need for strong interpersonal and communication skills, as well as the ability to work independently and at the same time excel in teamwork. Business specialized skills vary more significantly across regions, reflecting the dominant industries and specific economic contexts in each area.

[77] Vooren, M. et al (2020). Vaardigheden in beeld Skillsmonitor 2020. https://hos.srv02.ehero.es/wp-content/uploads/2020/12/Skillsmonitor-2020pdf-1.pdf

[78] Amsterdam Economic Board (2023). House of skills initiatives. https://amsterdameconomicboard.com/en/programme/house-of-skills/

[79] This programme was running from 1 April 2021 until 1 April 2023 as part of the Amsterdam Economic Board with strategic Partners AWVN, CNV/James, FNV, Municipality of Amsterdam, University of Applied Sciences of Amsterdam, ManpowerGroup, OBA, ROC van Amsterdam/Flevoland, TNO, VU University and the University of Amsterdam.

Region	Transferable skills	Industry specific skills
Southern Denmark	Adaptability Citizenship Commercial understanding and business development Creative thinking and ideation Critical thinking Cross-cultural cooperation Digital proficiency Interdisciplinary collaboration Knowledge co-creation Language proficiency Management of diversity Project management	Automation of all sectors Cyber security (technical knowledge, risk assessment, vulnerability testing) Design and user-friendly interfaces Elements of electrification ESG reporting Integrating systems Power to X Process technologist Product development Programming Prompt engineering Software engineering Qualify the use of AI and technology
Lower Austria	Adaptability Assess relevance of information Communication skills Decision making Plan and organize Recognize connections Work independently	Application of theoretical knowledge in practice Mastery of one's own subject
Central Macedonia	Communication Digital literacy English language Social skills	Data analysis Digital marketing Digital technologies Customer service Transport & logistics
Greater Poland	Adaptability Analytical and critical thinking Collaboration Communication skills Coordination Creativity Empathy Entrepreneurial mindset IT literacy Language proficiency Leadership skills Learning Pro-activity Problem solving Relational management Resilience Teamwork	AI Automation Applied Technology Business understanding Commercial understanding DevOps Data analysis specialist Deep learning specialist Handling local climate change Knowledge of industry area Legislation Low-code developer Marketing Programming (Java, Python) Sales Software engineering User-friendly
Alsace	Adaptability Crisis communication Decisions-making Linguistic skills	Information flow logistics Life cycle analysis Logistics River renaturation Risk management
Middle-Upper Rhine / Baden-Württemberg	Adaptability & Flexibility Dealing constructively with criticism Empathy Innovation and creativity Interdisciplinarity Learning ability and openness for life-long-learning Relation competences	IT Handling AI Technological skills Mobility Energy Supply
Amsterdam Metropolitan Area	Application of knowledge Critical thinking Decision making Points of view and values Social Interaction	Business Economics Commercial professions ICT technology Software development

Table 7: Skills needs summary across the regions.

The ability and motivation to learn is also empathised in several region and is a prerequisite for upskilling. Despite the large demand for hard skills, there is a clear focus on the transferable skills like communication, teamwork, resilience and leadership.

Furthermore, there are clear overlaps not only in terms of skills needed, but also in key industries across the EPICUR regions (as indicated in Table 8). This creates a background for stronger collaboration and knowledge exchange between the EPICUR partners.

Business/Industry area	**Regions**
Agricultural production and processing	Alsace, Baden-Wuerttemberg, Central Macedonia, Greater Poland, Lower Austria, Southern Denmark
Automotive	Alsace, Greater Poland, Baden-Wuerttemberg
Biotechnology	Alsace, Central Macedonia, Greater Poland, Southern Denmark
IT & Finance	Amsterdam, Alsace, Central Macedonia, Greater Poland, Southern Denmark
Life Science and Pharma	Amsterdam, Alsace
Manufacturing	Central Macedonia, Southern Denmark
Machinery & mechanical engineering	Baden Wuerttemberg, Lower Austria
Mining	Alsace, Central Macedonia, Greater Poland
Renewable energy	Alsace, Lower Austria, Greater Poland, Southern Denmark
Tourism	Alsace, Central Macedonia, Lower Austria, Southern Denmark
Wine production	Alsace, Baden Wuerttemberg, Lower Austria

Table 8: Key industries summary across the regions.

The needed transferable skills listed above are in line with the EU 8 key competences framework (see section 3.1.1) and is also aligned with the findings from an analysis by the World Economic Forum (Figure 5), particularly with regards to the emphasis on *analytical* and *creative thinking* as being the most important skills for workers in 2023[80]. There is a clear tendency that the lasting skills in general need across regions and industries are the transferable/soft

[80] World Economic Forum (2023). The Future of Jobs Report 2023. https://www.weforum.org/publications/the-future-of-jobs-report-2023/

skills. The turn-over of specialized skills are likely to increase aligned with the rapid technological changed. Some skills change from being specialized skills to general skills e.g., digital literacy.

Figure 4: The most need among workers. 2023. World Economic Forum, Future of Jobs (2023).

Many local/regional initiatives to encounter the skills gap have been presented in this section. In the next section they have been summarised and generalised into actions points to be addressed.

6. ACTION POINTS

Aside from the abovementioned action points in each regional profile and the identified added value of the analysis, this section provides an overview of activities that, through the research, were identified as reasonable solutions for the issues related to skills needs. This includes both action on the level of the EPICUR alliance and the "external" level – local, national and European. While some points reiterate those mentioned in the analysis section of the document,

other include conclusions drawn from the analysis that would be applicable to all partners.

This by no means purports to be an exhaustive or comprehensive list, but it provides highlights that the EPICUR partners think are particularly worth noting and acting upon.

A presentation of a categorized and generalised list of these action points are presented here. In section 6.1 a list of the initiatives and actions that can be undertaken by EPICUR alliance is presented.

The general list falls into categories of **Research & Advocacy, Policy, Funding schemes, Skills development, Curricular initiatives,** and **Industry-Education collaboration** as seen from figure below. It involves action point to be addressed on a political level, institutional level as well as by the enterprises.

Policy
- Ensuring skills recognition across Europe and across industries on an operational basis
- Facilitating seamless training and education between vocational and higher education
- Creating industrial higher education programs
- Creating a guide on transferable skills, substitution and the trajectories for upskilling

Research & Advocacy
- Researching reluctance to engage in and provide continuous education
- Spreading awareness of the need for continuous education.
- Clarifying the cost-benefit of investment in lifelong learning

Funding schemes
- Creating investment schemes and tailor-made offers for training and reskilling on regional, national and EU level
- Collaboration with labour unions on investment schemes

Curricular initiatives
- Support problem-based learning
- Support cross-disciplinary activities
- Promote entrepreneurship and entrepreneurial learning
- Support presentation & communication trainings
- Promote soft skills & competence workshops
- Integrate durable skills (agency, resilience)
- Training of cultural intelligence

Industry-education collaboration
- Creation of a forum of educational organisations and businesses with focus on agile skills development
- Collaboration between industry and educational systems on best practice in skills development
- Regular updating curriculum with industry involvement
- Creating new formats linked with industry (e.g., apprenticeships for adults, young researchers industrial internship).
- Promoting problem-based project works with industry
- Facilitating collaboration between industry/businesses and the educational system to link the non-institutional knowledge/technology with the educational institutions to ensure state-of-the-art knowledge and respond to the current needs in the industry
- Supporting SMEs with lifelong learning

Skills development
- Recognition of the importance of soft skills/transversal skills
- Comprehensive assessment of skills for upskilling
- Facilitating knowledge exchange between businesses on skills development
- Expanding use of microcredentials
- A continuous focus on skills development as initiated through the European year of skills
- Development of agile learning modules

Figure 5: Action points to address in order to close the skills gap.

6.1. Actions that the EPICUR alliance can take

Over the course of working on the report, the partners have either come across or identified a number of action points that the EPICUR alliance can take that would, most importantly, maximize the impact of the report and raise awareness regarding it. These actions can be generally divided into two categories – the ones addressing the issue of raising awareness about the report and the ones tackling the skills needs.

EPICUR Communication and Awareness

- Creating communication material (infographics, web-banners, etc.)
- Uploading the report and summary onto the EPICUR website
- Sharing the report within the EPICUR community and involved work packages (WPs)
- Organizing events for presenting this report to internal and external stakeholders
- Creating and sharing a summary of the report at various conferences
- Sending the report to academic/administrative members of the 9 universities
- Promoting the report as part of the European Year of Skills

EPICUR Collaborative Efforts and Networking

- Using the report:
    - for creating joint courses among the 9 universities
    - as a driver for the implementation of EPICUR SHAPE-IT tasks and activities, thereby creating conditions for those tasks to be addressing the needs identified in the report
    - as a ground for dialogues with various stakeholders in the political systems in the nine eco-systems
- Co-creation of workshops and courses addressing the soft skills need as indicated in Figure 6 on skills development

- Career guidance in line with the EPICUR Lifelong Learning Policy and taking skills gap into consideration
- Knowledge sharing on career guidance between the partner universities
- Creating a common database/forum for cooperation dialogue within the framework of employability and entrepreneurship activities of WP 5 of the EPICUR SHAPE-IT project
- Using the report as a basis of a dialogue between members of the 9 universities in order to create joint offerings (especially when that concerns the Teaching and Learning Centre – and teacher professionalization through it – in WP 4, Lifelong Learning Centre in WP 5, and the Graduate Hubs in WP 6 of the EPICUR SHAPE-IT project).

The need to implement these action points comes from the fact the findings in the report indicate that there are overlapping areas both in terms of needed skills and in terms of the key industries within the EPICUR regions (as summarized in Table 7 and 8). This creates a background for joint targeted activities that address those common needs. This also means that the partners can share knowledge, exchange experiences and team up to tackle the challenges. The report, thus, serves as a background for partners collaboration and as a source that clearly indicates where and in what areas such collaboration is especially needed.

7. ADDED VALUE

The analysis of the needed workforce skills in the nine regions points to a number of added values in relation to the EU focus on skills, the EPICUR alliance, the universities, and their political as well as labor market eco-systems.

At EU level, the joint desk research in combination with specific stakeholder inputs on skills needs in relation to identified regional key industries contributes with additional depth to the already existing material from European initiatives on how to understand the European job market, its present

and future need for skills and the various initiatives that could be taken in order to develop organizations, people and societies through sustainable solutions. Specifically, the Year of Skills Agenda 2023 is supported by the analysis with its data on skills patterns across countries and the confirmation of needed skills from the included skills and competence frameworks.

For the EPICUR alliance, the analysis provides a foundation for the work with other closely related tasks concerning lifelong learning and employability in the WP5 and other WP's. Here, the data on skills need at national level, key industries and both transferable and specific business-related skills can contribute with a direction for the further work on the lifelong learning policy, the lifelong learning center, supporting universities in developing relevant skills for students and employees and enhancing the collaboration with the external world in the nine regions.

Looking at the university level, the analysis can function as a supplementary basis for expanding the knowledge about skills and competences that each university could choose to focus on in the effort to make societal impact through education and research. Each university also have the opportunity to compare their eco-system with the other universities in relation to the workforce within identified key industries and thereby play a role in strengthened collaboration between the institution and the broader job market.

Finally, the data from the analysis can inform the political level in each region or country with information that combines existing desk research and concrete stakeholder inputs and potentially add knowledge as well as suggestions for actions in the effort to point to policy initiatives to develop skills that are relevant for both the workforce and the labor market.

8. Conclusion

As an alliance, the EPICUR partners are committed to addressing the big societal challenges that Europe and the world face. One of such challenges is related to the skills gap/mismatch, and this report provides the first step in the partners' efforts to tackle it (at least) in their regions.

Through focusing on analysing the workforce skills needs in the EPICUR regions, the partners identified key businesses and industries that are the economic drivers of their respective regions. This, in turn, was followed by looking at the specific skills and competences needed now and in the near future.

By identifying the industries and skills, the partners fulfilled the key goal of the report – providing a clear overview of the needs that can be addressed by the EPICUR alliance. Among the key findings is the fact that transferable skills are of the utmost importance in all nine regions. Such importance is exasperated by the fact that the pace of changes (which accounts for the skills gap) also require a new pace of skills acquisition. This necessitates action by both academic and non-academic institutions, with key actions identified as such within this report. With its unique perspective on the EPICUR regions, the report could become a "backbone" for determining the direction of some EPICUR SHAPE-IT tasks (so that they address the skills needs) and a source to return to. Through this, deeper connections can be formed between the partners, especially if they intend to tackle similar skills needs for similar industries. The report also forms a key part of the alliance's contribution to the European Year of Skills.

Thus, the next steps for this project include, in the short term, dissemination (as outlined in the Action Points section) and, in the short to long term, the implementation of action points outlined in section 6.

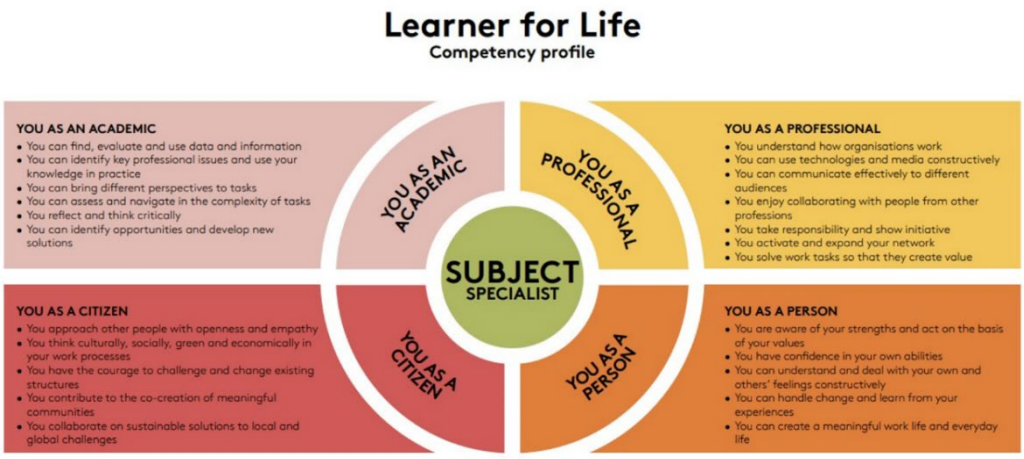
Through that, the expected impact of the report will concern the EPICUR universities (through tailor-made activities aimed at tackling the skills gap), key businesses and industries in the EPICUR regions (through potential connections and links with each other and the universities, and through having their skills

needs met in the long term), and a diverse set of target groups within the general public (through improved skills and competences).

The workforce skills needs report, therefore, through its analysis, establishes a point of departure for future EPICUR activities both specifically in the entrepreneurship and employability area and generally in all of its focus areas; and enables EPICUR to contribute to tackling the skills-related challenges of our time.

9. Annex

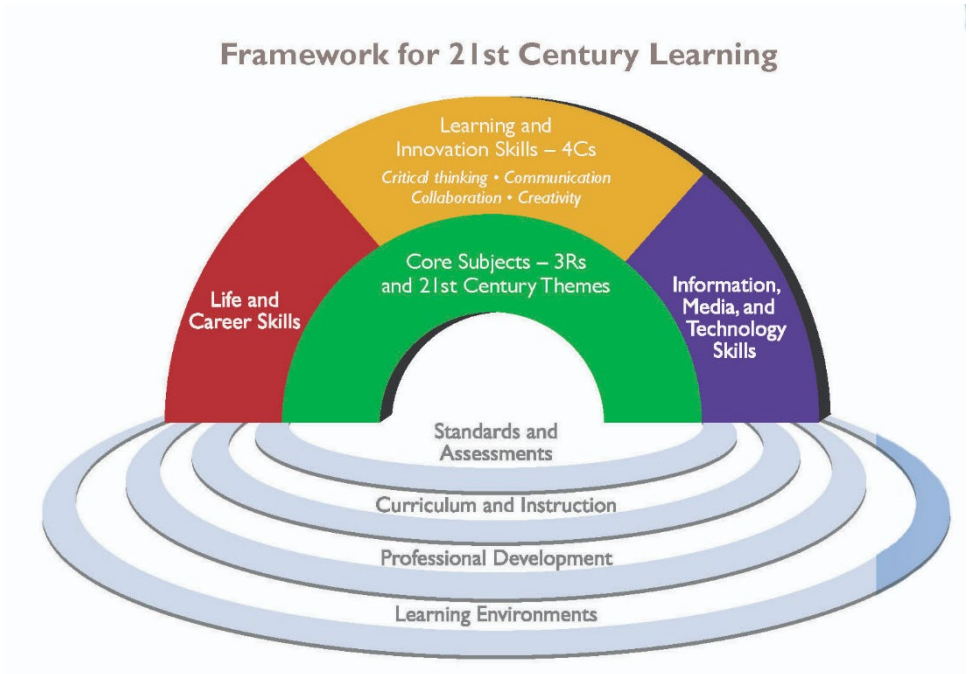
9.1. SDU Learner for Life model



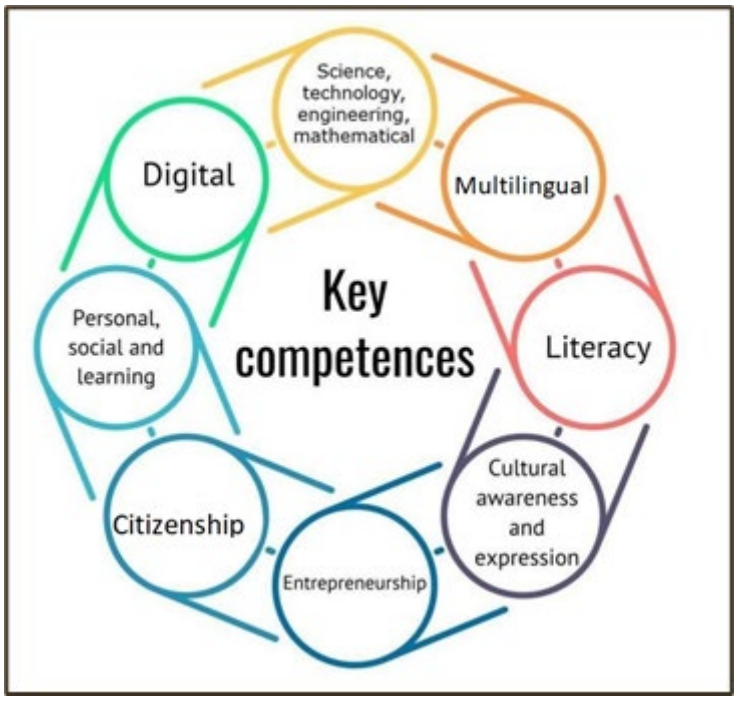
SDU RIO

9.2. KIT competence model

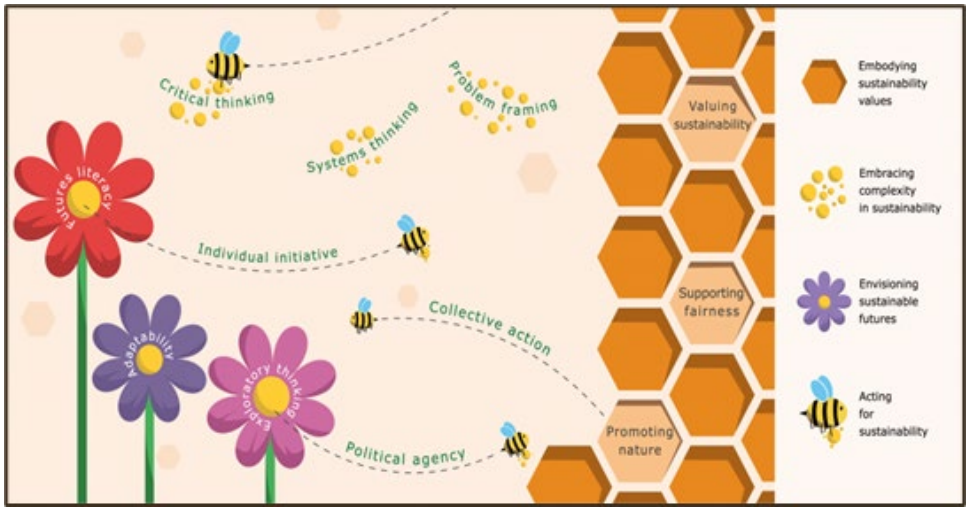
9.3. 21st century skills model



9.4. EU key competences model

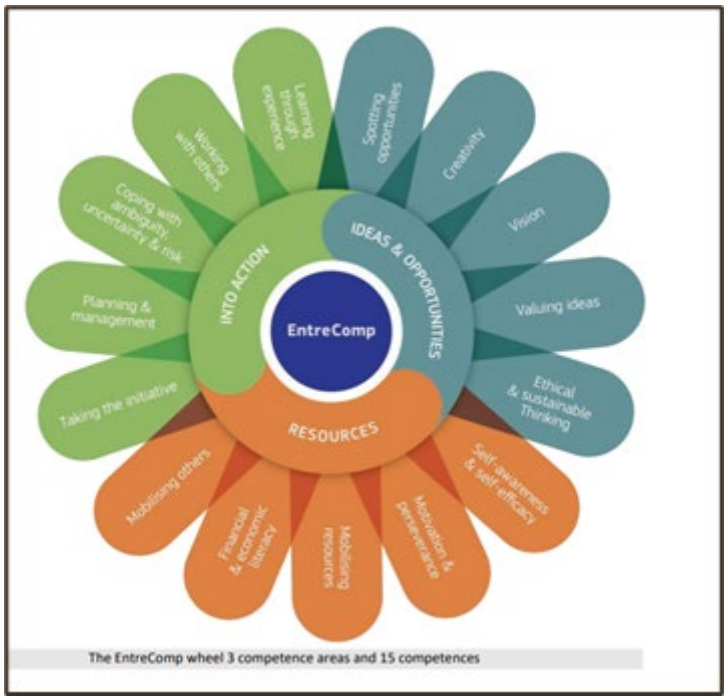


9.5. GreenComp model



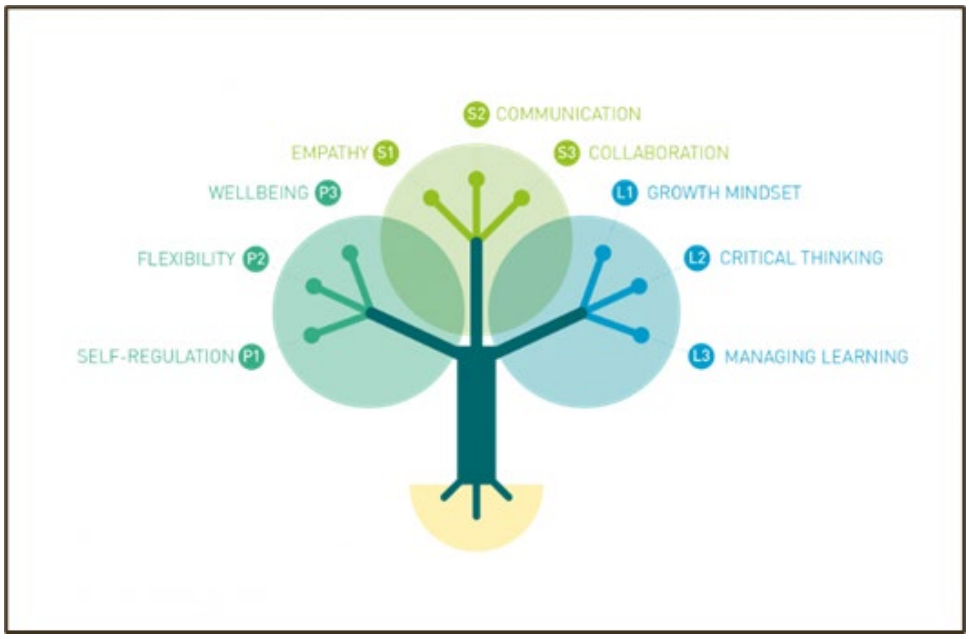
9.6. DigiComp model

9.7. EntreComp model



The EntreComp wheel 3 competence areas and 15 competences

9.8. LifeComp model



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