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Author name(s)	Alina Adriana Minea	
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This document has been submitted to the European Commission but is still under approval.

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Deliverable D1.1

Report on current and future needs for transferable skills

29/09/2023

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Abbreviations and Acronyms

Abbreviation / Acronym	Description
EUF	European University Foundation
HVL	Western Norway University of Applied Sciences
TUIASI	Gheorghe Asachi Technical University of Iasi
UAH	University of Alcalá
UCA	Université Côte d'Azur
UiT	The Arctic University of Norway
UL	University of Limerick
UPORTO	University of Porto
DoA	Description of the Action
ECR	Early Career Researcher
EDC	European Digital Credential
EQF	European Qualifications Framework
ERA	European Research Area
ESCO	European Skills, Competences, and Occupations
EUA	European Universities Alliances
HEI	Higher Education Institution
IPR	Intellectual Property Rights
GA	Grant Agreement
KER	Key Exploitable Result
KPI	Key Performance Indicator
LTMC	Local Talent Management Centre
MOOC	Massive open online course
OA	Open Access
TA	Target Audience
WP	Working Package

Executive Summary

This document offers the reference point for the project and aims to gather relevant data at the project start, in regard to existing training, feedback from employers, transferable skills needed etc. The D1.1 gathered data will be used as feedback for several work packages, as for example WP2 and WP3. The work can be summarized as: 1. Desk research carried out, based both on the results of existing/former EU wide projects/initiatives, available data at the national/local level and the current training offer by the participating HEIs, 2. Creation of the database of skills, 3. Creation of the database of possible future employers of PhD candidates, 4. Both databases will be harmonized with the ESCO classification to create a common taxonomy. 5. Methodology for gathering feedback from all partners. 6. Feedback collected through interviews, mapping of job ads and online questionnaire-based survey.

As an outline, the document contains data about the consortium HEIS' skills training offer for PhD candidates and about the most demanded skills by employers.

The results outlined that the most taught group of skills are thinking skills and competences (T2) and social and communication skills and competences (T4), while the least developed skills are by far physical and manual skills and competences (T5). In terms of specific skills, the most included skills in the training offered by HEIs are Planning and organizing (T2.2) and Communicating (T4.1).

To identify the most demanded skills in the job market, we used data from three different sources. Firstly, EURES (i.e. EURES is a European cooperation network of employment services, designed to facilitate the free movement of workers) was checked and a database on skills demand has been generated based on the need for transferable skills expressed by employers on published job ads during the month of February 2023. Those transferable skills were also labelled adhering to the ESCO classification. The skill most demanded by employers is the ability to collaborate in teams and networks (T4.3), while the lowest demand concerns the skills related to physical and manual competences.

Furthermore, to gather relevant data, a minimum of 10 employers identified per each partner country (from various sectors and disciplines) were invited to complete a questionnaire. The feedback received through the questionnaires was carefully analyzed to identify missing transferable skills (according to ESCO definition) needed in the non-academic sector. All the data were discussed and connected with data attained from JobAds mapping and interviews. If it discusses the applied surveys (i.e. to traditional employers of each HEI from DocTalent4EU), the most demanded transferable skill (i.e. thus, the most relevant for a future employee) is T2 (thinking skills and competences), followed by T3 (self-management skills and competences) and T1 (core skills and competences). Following the surveys, several meetings with some of the employers were organized by 3 of this consortium partners in order to get additional feedback.

Based on this complex analysis, the main lack of training in order to support employability of PhD graduates seems to concern primarily T4.3 - collaborating in teams and networks, T3.1 - working efficiently, T3.2 - taking a proactive approach and T4.1 – communicating.

Finally, the results were carefully discussed at length by the consortium partners and feedback to WP 2 and WP4 was produced as input.

Introduction

This document outlines the desk research undertaken on the ESCO database of transferable skills and competences, combined with a mapping of the EURES platform, a survey of employers and interviews based on job ads description, as well as the most-needed competences for the future employees.

TUIASI, UCA, UiT, UAH, UPORTO, HVL, UL are the partners responsible for Tasks that were performed to deliver D1.1.

The overall objective of this deliverable was to determine whether the skills acquired during doctoral training reflect current societal and economic needs, with the long-term aim of improving transferable skills training throughout and thereby enhancing the employability of PhD candidates. Furthermore, the tasks undertaken in D1.1 seek to promote the profiles of PhD holders outside academia and help diversify their career prospects. Additionally, in this deliverable we developed and implemented a methodology to determine the transferable skills that are currently in demand outside of academia, based on the experience of previous projects and input from national/local scrutinization. We validated these results through online surveys which were sent to non-academic actors, as well as identifying the transferable skills that will be awarded by digital credentials (WP3), based on the combined results of this desk-based research and survey analysis.

Tasks related to D1.1, as stipulated in the Grant Agreement, were as follows:

- Task 1.1 Mapping the transferable skills against ESCO (Task leader: UiT, Contributors: all HEIs)

Desk research will be carried out and will be based both on the results of existing/former EU wide projects/initiatives, available data at the national/local level and the current training offer by the participating HEIs, so as to create a database of skills and a database of possible future employers of PhD candidates (with input from all partners). Both databases will be harmonized with the ESCO classification to create a common taxonomy.

- Task 1.2 Gathering feedback from the non-academic sector on most needed transferable skills (Task leader: UL, Contributors: all partner HEIs)

Following the ESCO classification of transferable skills, feedback will be collected through interviews, mapping of job ads and an online questionnaire-based survey. UL will set up a methodology that all partners will implement to gather feedback. A minimum of 10 employers from each partner country (from various sectors and disciplines) will be invited to complete them.

- Task 1.4 Analyzing the transferable skills needs (Task leader: TUIASI, Contributors: all partner HEIs)

All partners, under the coordination of TUIASI, will analyze feedback received through the questionnaires to identify missing transferable skills - according to ESCO definition - needed in the non-academic sector.

- Task 1.5 Defining the list of credentials to be awarded to cover the transferable skills (Task leader: UCA, Contributors: all partner HEIs)

Based on the previous tasks, this task will define the transferable skills that PhD candidates should acquire during their training to meet the needs of the labour market, together with the associated digital credentials (Doc4TalentEU credentials) to acknowledge the acquired skills. This will serve as input to WP2 and WP3 and will facilitate the development, or adjustment of, specific training not already available within the partners' respective institutions.

Aim of the deliverable

The aim of this deliverable is to create a reference point for the project and to gather relevant data at the start of the project regarding existing training, feedback from employers, transferable skills needed etc.

The content of this deliverable will provide feedback for several work packages, including WP 2 and WP 3.

Sub-tasks:

- ✓ Desk research carried out, based both on the results of existing/completed EU-wide projects/initiatives, available data at the national/local level and the current training offered by the participating HEIs, so as to create a database of skills and a database of possible future employers of PhD candidates (with input from all partners). Both databases will be harmonized with the ESCO classification to create a common taxonomy.
- ✓ Methodology for gathering feedback from all partners.
- ✓ Feedback collected through interviews, mapping of job ads and an online questionnaire-based survey.
- ✓ A minimum of 10 employers from each partner country (from various sectors and disciplines) will be identified and invited to complete the questionnaire.
- ✓ Analyze the feedback received through the questionnaires to identify missing transferable skills - according to ESCO definition - needed in the non-academic sector.
- ✓ Define the transferable skills that PhD candidates should acquire during their training to meet the needs of the labour market, together with the associated digital credentials (Doc4TalentEU credentials) to acknowledge the acquired skills.

Data sources:

- ✓ existing/former EU wide projects/initiatives,
- ✓ available data at the national/local level – input from all HEIs
- ✓ current training offered by the participating HEIs– input from all HEIs
- ✓ employers' database – input from all HEIs
- ✓ online questionnaire-based survey – input from all HEIs
- ✓ interview-based survey – input from TUIASI, UPorto, ULim

- ✓ mapping of job ads – input from EURES

1. Mapping the transferable skills against ESCO

1.1. Transferable skills in ESCO

ESCO is the European Skills, Competences, Qualifications and Occupations database. Through this listing of skills and competences, the goal is to provide a better recognition of research professions, by offering researchers a better understanding of the skills and competences they need. ESCO information is based on a European Commission initiative (see https://esco.ec.europa.eu/en).

More precisely, ESCO (European Skills, Competences, Qualifications and Occupations) is the European multilingual classification of skills, competences, qualifications, and occupations that works like a dictionary, describing, identifying and classifying professional occupations and skills relevant for the EU labour market and education and training area, and systematically showing the relationship between those occupations and skills. ESCO is available on an online portal where its dataset of occupations and skills can be consulted and downloaded free of charge and its common reference terminology helps make the European labour market more effective and integrated and allows the worlds of work and education/training to communicate more effectively with each other.

The added value of ESCO skills needs to be considered, studied, and implemented. For example, the online job portals may use ESCO for describing the job vacancies. Jobseekers may, thus, describe their skill set using the same terminology as the job vacancies. This approach eases job matching on skills level.

Jobseekers may use ESCO to build personal skill profiles and to record their learning outcomes in applications. On the other hand, HEIs may use ESCO to improve planning and curriculum development. Plus, ESCO may allow us to react quicker to emerging skill needs.

At the European level, ESCO provides for a closer matching of jobseekers to jobs through the EURES Job Mobility Portal.

Refer to **Annex 1** for the complete list of skills as defined by ESCO. Data from **Annex 1** was extracted from ESCO and used as reference for the entire project, including the applied surveys and gathering data from EURES and HEIs.

1.2 Available data from existing/former EU wide projects/initiatives

This section describes the available data from existing or former EU projects and initiatives on the employability of PhD holders. The main findings are that, because of a lack of opportunities in academia, a significant number of PhD graduates move to non-research positions, where the contribution of their doctoral training is not as significant. To help facilitate such intersectoral mobility, providing training in transferable skills would be highly beneficial. However, the training of PhD students in transferable skills in Europe is still limited (i.e. there is a high training in professional and research skills), and this creates a mismatch of skills between PhD holders and employers from non-research sectors.

1.2.1. Context

Since its inception in medieval times, the PhD has drastically evolved. An elitist education offered to a small group of people in a limited number of countries grew into an international education program, offered by hundreds of universities, training tens of thousands of PhD students (Nerad and Evans, 2014). One of the main recent evolutions of the PhD is its internationalization, aided by digital technologies and real time communication, consequently extending and deepening international collaboration among researchers (OECD, 2016). And even if some signs of slowdown are appearing in some sectors, the number of PhD graduates is increasing worldwide, with an annual growth rate of PhD graduation of about 5% from 2001 to 2010 (O'Carroll *et al.*, 2012). This trend, however, gives cause for some concern regarding the employability of PhD graduates. Due to a scarcity of funding, career opportunities are lacking in academia and research for doctorate holders. As a consequence, most of them will be looking for employment outside academia throughout their career (Cusack *et al.*, 2021). This highlights the need for PhD students to develop transferable skills that will help them find employment outside academia.

1.2.2. The need for transferable skills

Definition of transferable skills

Transferable skills are defined as the skills which are essential for professional competence, regardless of the sector or level of employment. Such skills include project management, communication or team-working skills, among others (Chadha, 2006). These transferable skills, also sometimes referred to as soft skills, are especially valued by the labour market and are determinant in one's success in life (Heckman and Kautz, 2012).

Value of a PhD for a professional career

Doctoral programs have for long been the target of critics, who regretted the lack of transferable skills, the lack of practical knowledge and the overspecialization of PhD graduates, in a situation where many of them will face interdisciplinarity in their professional careers (Cui and Harshman, 2020). The results from the DocEnhance project (see https://docenhance.eu/), which surveyed PhD graduates about the contribution of the doctorate to their professional careers, confirms this over-specialisation. In general, the surveyed graduates agree that their PhD facilitated their progression towards their desired career. However, this facilitation appears to be limited, and mainly due to the research skills developed during their doctoral program. Of all the respondents in the DocEnhance project, 54% indicated they were overeducated for their job, and for the respondents not involved in research activities, this proportion expanded to over 88%. Furthermore, this latter category mainly considered that their current job was only partly related to the subject of their PhD (Karatzia, 2020).

Asked about the quality of the doctoral training they received in general, the respondents from the DocEnhance project indicated that the contribution of the PhD to their careers was lowest on the professional level. This level of training was considered minimal for starting a new job or creating a business, and this result was consistent both for academic and non-academic careers. Also, by looking at the differences between researchers and non-researchers, it shows that, in general, PhD graduates working in research organizations or universities are more positive about the added value of their

doctoral training compared to graduates working outside of research institutions. The professional contribution of the PhD was especially low for non-researchers, with a larger proportion of them considering the transition to their first job as difficult, and that the doctorate did not improve their careers. Asked if their PhD had properly prepared them for their first job, their answers scored the lowest amongst all the professional categories, with an average score of 2.5 out of 5 (Karatzia, 2020).

Skill gaps and mismatches

The previously discussed results clearly highlight the need to complement doctoral training with the employers' expectations.

However, in its current form, the skills taught during a PhD are often highly focused on a career in academia, and even when transferable skills are offered, they are generally aimed at improving research skills (European commission *et al.*, 2022). The MORE4 study found that over 80% of PhD students focus on developing such core research activities (European Commission. Directorate General for Research and Innovation. *et al.*, 2021). This is consistent with the predominant desire for PhD graduates to follow a career in academia and in research, with 66% of them planning to keep working in this sector after graduation *(European commission et al.,* 2022; *European commission,* 2023). But considering the low levels of funding offered by universities, the work conditions of researchers working in academia have degraded. The problem is especially acute for early career researchers, 90% of them being in precarious situations, with relatively short-term contracts (OECD, 2016). As a consequence, due to a lack of research positions, less than half of the recently graduated PhD candidates secure a job at university after graduation, leaving a significant portion of them to deviate towards a non-research job instead. In the long-term, the proportion of PhD graduates achieving a career in academia falls to only 10 to 15%, which means that 85 to 90% of PhD holders will end up looking for a job outside academia, a career shift that their doctorate training insufficiently prepared them for (Karatzia, 2020).

In addition, there is a substantial lack of recognition of research-based professions in the labour market, and for professions linked to research, there is an insufficient matching of demand and supply (European commission *et al.*, 2022). Looking more closely at the mismatch between the skills acquired during the PhD and the skills required at their current job, the conclusions from the DocEnhance project are that the biggest skill gap concerns project management skills, effective communication and negotiation. The importance of transferable skills in the PhD students' education to improve employability has been recognised and this aspect is now part of the principles defining doctoral programs in many Europeans universities. Among other guidelines, those principles confirms that doctoral training must prepare graduates for employment outside academia and include the development of transferable skills, which should be taught to all students from all disciplines (Christensen, 2005). This initiative is in line with the recommendations formulated by the ResearchComp European project (*European commission,* 2023), which emphasize the need to develop transferable skills, to broaden the scope of training, and to offer training and career services during the PhD and throughout the career of graduates (European commission *et al.*, 2022). Considering the increasing pace of changes in the world, acquiring soft skills to prepare students for new labour market

challenges has been a recurring recommendation from UNESCO, the OECD and the World Bank over the past years (Guerci *et al.*, 2022).

This mismatch between skills held by PhD graduates and the skills needed in their jobs has consequences at the individual level but it could negatively impact the societal level as well. One of the shortcomings of doctoral training as highlighted in the DocEnhance project was in relation to entrepreneurship, and how PhD graduates feel poorly equipped to start their own business. A publication from the Chameleons European project pointed out that in order to address the grand challenges that society is facing (such as climate change), it requires institutional entrepreneurs and big thinkers (Cusack *et al.*, 2021). Those are people who can display critical thinking, challenge prevailing regulations, and create discontinuities in the world of organizations by using political sense. This is a set of skills that graduates are suspected not to sufficiently acquire through their doctoral training (Leniston and Mountford, 2021).

Mobility of PhD graduates

The importance of developing transferable skills is increased by the desire of PhD graduates to experience some mobility during their career. On average, about 36% of respondents from the DocEnhance project indicated their intention to move to a different sector of employment (inter-sectorial mobility). The motivation behind this professional mobility was shown to be mainly in order to acquire new skills and experience (Karatzia, 2020). The proportion of researchers looking for alternative career paths is increasing, following a higher diversity of research careers (European commission *et al.*, 2022). However, the desire for such intersectoral mobility remains relatively low amongst the PhD graduates working in academia (European Commission. Directorate General for Research and Innovation. *et al.*, 2021). Most graduates are planning to stay in academia at the end of their PhDs, but the lack of funding and opportunities offered to PhD graduates in research institutions is the main reason for graduates to orient themselves towards a non-research job and push doctorates to embrace intersectoral mobility (Karatzia, 2020). This could explain why graduates are less attentive to job offers outside academia and therefore less prepared to move to a different sector (European commission *et al.*, 2022).

In addition to mobility to another sector, this lack of opportunity also creates geographical mobility, with graduates moving to another country in order to pursue research opportunities abroad, creating a situation of brain drain for Eastern and Southern European states (European Commission. Directorate General for Research and Innovation. *et al.*, 2022). Though, geographical mobility can be motivated by other factors, and facilitating mobility of students is a European objective, as seen through the MyAcademicID initiative or the PhD Hub platform (MyAcademicID consortium, 2020). Overall, international and interdisciplinary mobility is more valued for recruitment and career progression than intersectoral mobility (European Commission. Directorate General for Research and Innovation. *et al.*, 2021).

1.2.3. Overview of the level of training of transferable skills

Training of doctorates

Training in transferable skills for PhD students can originate from different sources. The most manifest is through formal training offered by the university, such as a course or seminar, but collaboration with external organizations, internship programs or mobility can also yield results in transferable skills training. However, not all those sources provide similar quality training. Formal training seems to give the best results, followed by training-on-the-job, while collaboration with external organizations impacts a smaller set of skill development (Karatzia, 2020).

In terms of formal training, it was found through the DocEnhance project that almost a quarter of the students answering the questionnaire did not have any transferable skills training available during their PhDs, while 29% had mandatory training. In total, 60% of the doctorates surveyed received such training during the completion of their doctoral program (Karatzia, 2020). The results from the MORE4 study differ in this regard, and this survey found that only 32% of graduates received transferable skills training in 2019, a slight decrease from the results found in 2016 (European Commission. Directorate General for Research and Innovation. *et al.*, 2021). Considering the population surveyed during the MORE4 study is much larger than the one surveyed as part of the DocEnhance study, the former study and results are considered to be more reliable. The MORE4 study also highlighted a stark difference between European countries in regard to transferable skills training, from 80% of PhD students receiving such training in Romania to below 20% in Lithuania (European Commission. Directorate General for Research and Innovation. *et al.*, 2021). Overall, this clearly indicates a low level of training in transferable skills for PhD students in Europe. Furthermore, results from both studies imply that some PhD students did not engage in any transferable skills training even though they had the opportunity to do so, pointing to a lack of recognition of the value of such training by the students.

European initiatives to improve training

European initiatives have been directed at developing transferable skills for PhD graduates, as well as their employability outside academia. A few of those initiatives are described here, in the next lines.

ResearchComp, for the European Competence Framework for Researchers, is a project aiming at creating a common understanding around the competences involved in research activities. The expected outcomes are to support research careers, facilitate mobility between sectors of employment, improve employability of researchers and improve the attractivity of research careers. As part of this study, a taxonomy of skills related to research activities was defined. Those skills are categorized into 7 groups, containing in total 38 competences. Acquiring proficiency in all competences is not necessary, however the researchers are encouraged to develop competences in all 7 groups, which are:

- ✓ Doing research,
- ✓ Managing research,
- ✓ Managing research tools,
- ✓ Making an impact,
- ✓ Working with others

- ✓ Self-management,
- ✓ Cognitive abilities.

Those skills were made so they could be integrated in an updated version of the ESCO classification.

Other relevant initiatives can be summarized as:

- ***EntreComp:*** The entrepreneurship competence framework

- ***DigComp:*** The Digital Competence Framework for Citizens (DigComp) provides a common understanding of what digital competence is.

- ***European e-Competence Framework*** (e-CF) is the European Competence Framework for Researchers that classifies 40 competences for the ICT professionals

The **ESCO** classification, for European Skills, Competences, Qualifications and Occupations, is a compendium of skills and competences aiming at providing a common language in order to better match supply and demand in the European labor market and support mobility across the continent, as was explained in the beginning of this document.

1.2.4. Effect of training in transferable skills on career development

The relevance of the training in transferable skills was highlighted in the DocEnhance project, as was earlier depicted. Graduates who received such training during their PhDs generally showed themselves to be significantly more positive about the contribution of their PhD to their professional career than the ones who did not. In general, they feel better prepared for their first job and experience a better career progression. The training in professional skills, communication and management was correlated with higher results in almost all metrics, such as level of salary, professional status, more engaging work assignments or improvement of competencies (Karatzia, 2020). The MORE4 study found that 86% of the researchers in the EU regarded transferable skills as very important for career progression (European Commission. Directorate General for Research and Innovation. *et al.*, 2021).

Considering that training in transferable skills has the potential to increase employability of PhD graduates, recommendations were formulated at the European level to expand training and develop initiatives aiming at cultivating the transferable skills of researchers. Improving training of transferable skills, through all forms of learning, is amongst the priorities for joint action formulated in the Pact for Research and Innovation in Europe (European commission *et al.*, 2022).

1.2.5. DocEnhance former project

DocEnhance project was focused on similar outcomes and was developed by three of the partners involved in the current project, i.e., EUF, UAH and UiT. In the next lines, a summary of its outcomes is included.

DocEnhance - Regional stakeholder meetings

As part of the DocEnhance project, several regional stakeholder meetings were conducted in autumn 2020 by 4 partners of the project:

- ✓ UMB, Slovakia
- ✓ TAU, Finland
- ✓ FUE and UAH, Spain
- ✓ UiT, Norway

Each partner focused on a different professional sector in a different country, chosen in order to better represent future societal challenges. Transferable skills will be needed to address those challenges, and four regional workshops were designed to understand which of those skills are needed across Europe for each of the represented sectors. The 4 workshops organized through DocEnhance project are listed below:

1. Non-profit sector
2. Prepare PhD holders to work in the industry, through cooperation between university and industry
3. Transferable skills in the technology sector
4. Data stewardship and related transferable skills

The complete results of these regional stakeholder meetings are summarized in Deliverable D4.1 of the DocEnhance project, *Evaluation of Regional Stakeholder Workshops*.

DocEnhance – Online stakeholder consultation

In order to complement the regional stakeholder meetings, questionnaires were sent to employers from the non-academic sector in November 2021. The goal was to gather insights on the perceived value of the doctorate degree by non-academic employers, but to a larger audience than the regional workshops, to better discern gaps in transferable skills needed outside academia. In parallel to the survey sent to employers, a similar career-tracking survey was sent to PhD graduates, with the goal of comparing the results of those surveys and seeing the difference between the skills acquired by graduates and how employers value those skills. Graduates were asked to self-assess their proficiency on a list of 24 skills, and the employers assessed how important they thought these skills were for PhD holders. The questionnaire was distributed to employers from varied sectors of activity and from different countries in Europe and in the United States of America. In total, 65 answers were kept for analysis.

The results show that the PhD holders feel adequately prepared for the job market, considering they ranked their own skills higher than what the employers required for a majority of the skills assessed. The skills that employers ranked higher than PhD graduates are: entrepreneurship and networking, and to a lesser degree, team working, project management, intellectual property and research valorisation.

When asked some open questions about which skills PhD holders should develop, employers mentioned, having a more practical and hands-on knowledge as to how business and industry operate, be able to adapt to the faster working pace, as well as enhancing skills generally related to project management and team working. Employers suggested improving collaboration with the industry

during doctoral training in order to get PhD involved with industry project and bridge the gap between research and industry.

Concerning the recruitment of PhD holders, the most sought-after qualities by employers amongst PhD graduates are: a specialist knowledge of relevant subject area and method, and generalist/transferable skills and competences. For organizations which are not recruiting PhD holders, the main reasons expressed for doing so are that they do not have activities requiring PhD expertise, or that they believe PhD holders lack the skills those organisations need.

The complete results of this survey are available in the deliverable *DocEnhance online stakeholder consultation (DocEnhance*, 2022, https://docenhance.eu/*)*.

1.3 Transferable skills identified in Job Ads from EURES

The current report was made by comparing the offer and the demand of transferable skills on the job market. The skills demand was checked in the EURES database of the European Commission (https://ec.europa.eu/eures/portal/jv-se/home?lang=en) by searching and analyzing the job ads that requires doctoral education, in terms of required competences. A number of 297 job ads were analyzed and the correspondence with ESCO was accomplished.

The database on demand has been generated based on the need for transferable skills expressed by employers on published job ads during the month of February 2023. Those transferable skills were also labelled adhering to the ESCO classification.

Having ESCO labels on both databases allowed the skills demanded and the skills offered to be compared. This analysis was done using Excel.

In Figure 1 is a print screen of the Excel (that can be made available on request) that we built in order to extract from job ads the transferable skills required by employers. Figure 1 shows the methodology adopted, as well as data that were extracted and further processed. More exactly, the extracted data were:

- JobAd title
- Employer
- Country
- JobAd language
- Type of position
- Contract type (permanent/temporary/consultancy)
- Link where the Job Ad was posted in EURES
- Full text in original language

The second step was to process the data extracted to obtain:

- Full text in English language (automatic translation), if the original text was not in English

- Transferable skills, as written in the Job Ad
- Transferable skills equivalence with ESCO

It is important to highlight here that the equivalence between competences identified in the Job Ad and ESCO was performed to our best knowledge.

JobAd title	Employer	Country	JobAd language	Type of position	Contract type	Link	Full text in original language	Full text in English language (automatic translation)	Transferable skills, as written in the Job Ad	Transferable skills equivalence with
IT Support Engineer Mobile Team Antwerp/Brussels	EDITX BVBA	Belgium	english	technicus computerhardware	consultancy	https://ec.europa.eu/eures/portal/jv-se/jv-details/JOTY3NZYxNTYtYzmYS00YzMyLThmNDEtNzQ1YzZhOWQwMzM5WUXDMTjvDisplayLanguage=nl&lang=en	Computacenter Belgium is looking for an IT Support Engineer – Mobile Team Who We're Looking For Are you passionate about IT and dealing with customers at all levels? Do you have basic hardware/software breakfix experience? Ideally you live in the Antwerp or North of Brussels area as your customer base will be between Antwerp and Brussels. If so, then we would like to discuss your next career move! We have an opportunity for an IT Support Engineer to join our dynamic Technical Resource Group Mobile team. In our Mobile team you will have different assignments at different locations with several of our customers. What You'll Do Working as part of a dynamic team you will be providing 1st and 2nd line on-site user support. This includes analyse incidents, problems & service requests, propose solutions and help implementing them. You will also be responsible for any escalation and follow up. Some of the daily activities are: Preparing Workstations for newcomers. Maintain and update of Documentation for Requestions (e.g., Checklists) Following up Leaver Processes and Hardware return of Leavers Queue Management & Task Management for both Drop-In Clinic's and Request Management Support & Follow up of International Assignments as required Backup Stock Management as required What You'll Need	Computacenter Belgium is looking for an IT Support Engineer – Mobile Team Who We're Looking For Are you passionate about IT and dealing with customers at all levels? Do you have basic hardware/software breakfix experience? Ideally you live in the Antwerp or North of Brussels area as your customer base will be between Antwerp and Brussels. If so, then we would like to discuss your next career move! We have an opportunity for an IT Support Engineer to join our dynamic Technical Resource Group Mobile team. In our Mobile team you will have different assignments at different locations with several of our customers. What You'll Do Working as part of a dynamic team you will be providing 1st and 2nd line on-site user support. This includes analyse incidents, problems & service requests, propose solutions and help implementing them. You will also be responsible for any escalation and follow up. Some of the daily activities are: Preparing Workstations for newcomers. Maintain and update of Documentation for Requestions (e.g., Checklists) Following up Leaver Processes and Hardware return of Leavers Queue Management & Task Management for both Drop-In Clinic's and Request Management Support & Follow up of International Assignments as required Backup Stock Management as required What You'll Need	Good administrative experience, attention to detail, ensures accuracy of data, provides data for reporting and processing of information Excellent customer facing and communication skills; adaptable and welcoming of change and communicating change to customers Excellent time management and organisational skills Willing to take initiative and be hands-on Very good communication skills, both verbal and written in English and good command of Dutch and/or French	T2.2, T2.3, T3.1, T6.5 T4.1, T4.2, T4.5 T2.2, T2.3, T3.1 T2.3, T3.2 T1.1, T2.1, T4.1
Senior PHP Laravel developer	BIQS IT BV	Belgium	dutch	software analist - software tester - data warehouse designer - databaseontwerper - software ontwikkelaar	permanent	https://ec.europa.eu/eures/portal/jv-se/jv-details/OWYzZWI4MzItZjI3My00YjM4LTkwNmUtZTFlNDNmYTVmYWVkMSIDMTjvDisplayLanguage=nl&lang=en	Ben jij onze geknipte projectleider? Als senior PHP/Laravel developerbij BIQS werk je mee aan de ontwikkeling en uitbouw van webapplicaties voor eigen oplossingen en voor onze klanten. Je krijgt de kans om onze huidige applicaties verder uit te bouwen én nieuwe applicaties te ontwikkelen. Als senior ontwikkelaar ben je 'in the lead' van verschillende projecten, een functie waarin je jezelf elke dag kan uitdagen en professioneel kan ontwikkelen. Je neemt graag je verantwoordelijk voor: Het ontwikkelen en aanpassen van applicaties op basis van technische analyses De ontwikkeling van koppelingen naar andere applicaties, webkoppelingen ... Het ontwerpen, ontwikkelen en testen van toepassingen, lijsten, interfaces, conversieprogramma's .. De implementatie van applicaties bij de klant Herken je jezelf? Je bent op de hoogte van en steeds nieuwsgierig naar alles wat met mobiele apps en webapplicaties te maken heeft. Je volgt de laatste ontwikkelingen met plezier op de voet en deelt die graag met het hele team. Je werkt niet alleen praktisch en pragmatisch, je beschikt ook over een flinke portie doorzettingsvermogen. Dankzij je analytische en technische vaardigheden vind je dan ook snel de juiste oplossingen. Je bent in staat om vlot te communiceren met je collega's én klanten en stelt je flexibel op. De klant verderhelpen?Daar krijg je tonnen energie van!Je voelt je als een vis in het water in een groeiende	Are you our perfect project leader? As a senior PHP/Laravel developer at BIQS, you contribute to the development and expansion of web applications for our own solutions and for our customers. You will have the opportunity to further expand our current applications and to develop new applications. As a senior developer you are 'in the lead' of various projects, a position in which you can challenge yourself every day and develop professionally. You are happy to take responsibility for: Developing and adapting applications based on technical analyses The development of links to other applications, web links ... The design, development and testing of applications, lists, interfaces, converters ... The implementation of applications at the customer Do you recognize yourself? You are aware of and always curious about everything that has to do with mobile apps and web applications. You enjoy following the latest developments closely and are happy to share them with the entire team. You not only work practically and pragmatically, you also have a good portion of perseverance. Thanks to your analytical and technical skills, you can quickly find the right solutions. You are able to communicate smoothly with your colleagues and customers and you are flexible. Helping the customer? That gives you tons of energy! You feel like a fish in water in a growing organization, and you like working in a friendly atmosphere. What knowledge and competences do you need? A bachelor's or master's degree, majoring in Computer Science (or	You enjoy following the latest developments closely and are happy to share them with the entire team. You not only work practically and pragmatically, you also have a good portion of perseverance. Thanks to your analytical and technical skills, you can quickly find the right solutions. You are able to communicate smoothly with your colleagues and customers and you are flexible. You are open to expanding your knowledge through self-study and training.	T2.1, T2.3, T2.4 T3.1, T4.1, T4.2 T2.1, T2.3, T5.1 T4.1, T4.2, T4.3, T4.5 T3.2, T3.4, T4.2, T6.6
Een beleidsmedewerker rectoraat Uhasselt	Universiteit Hasselt OI	Belgium	dutch	beleidsverantwoordelijke	permanent	https://ec.europa.eu/eures/portal/jv-se/jv-details/YWYxMjFhZDgtOGFjMC00MTA3LTgxMDgtODgxNmJhYzUyMDExIDMTjvDisplayLanguage=nl&lang=en	Over de functie Als Beleidsmedewerker volg je een aantal academische beleidsdomeinen binnen de UHasselt op de voet. Je adviseert en ondersteunt de academische directie bij het nemen van beslissingen en het ontwikkelen van de toekomstvisie. Jouw kernopdrachten als Beleidsmedewerker rectoraat zijn als volgt: Je bent owner van de toegewezen beleidsdomeinen en hebt de verantwoordelijkheid om vanuit jouw kennis en informatie het dagelijks bestuur en college van decanen te ondersteunen in het nemen van beslissingen. Je formuleert procedures, richtlijnen, nota's, rapporten met als doel het beleid te implementeren. Je bouwt expertise op en je geeft advies door op zoek te gaan naar en het analyseren van informatie. Je neemt deel aan strategische projecten en stuurt zelf enkele strategische projecten aan. Voorbeeld hiervan is de opstart van het project rond de loopbaanpaden van het academisch personeel waarbij aandacht zal uitgaan naar de inhoudelijke aspecten bij evaluaties, procedures en verantwoordelijkheden bij de evaluatie, de administratieve opvolging. Bij de uitwerking van dit project is samenwerking en overleg met de betrokken diensten en faculteiten cruciaal. Je zoekt mee voor een slimme en efficiënte werking. Je stelt je kritisch	About the job As a policy officer, you closely follow a number of academic policy areas within Hasselt University. You advise and support the academic board in making decisions and developing the vision for the future. Your core tasks as Policy Officer Rectorate are as follows: You are the owner of the assigned policy areas and you have the responsibility to support the executive board and board of deans in making decisions based on your knowledge and information. You formulate procedures, guidelines, notes, reports with the aim of implementing the policy. You build expertise and you give advice by searching for and analyzing information. You participate in strategic projects and manage some strategic projects yourself. An example of this is the start-up of the project on the career paths of academic staff, in which attention will be paid to the substantive aspects of evaluations, procedures and responsibilities in the evaluation, and administrative follow-up. Collaboration and consultation with the departments and faculties involved is crucial in the development of this project. You help ensure smooth and efficient operation. You adopt a critical attitude and build in the necessary evaluations of your own work processes, but also of the results and adjustments of the projects You provide expert advice and are alert to developments	You fit in perfectly with our team if you like order and structure. You like to formulate a vision from a helicopter view with attention to the long term and to convert it into strategic frameworks that contribute to the organisation's vision of the future. You are a strong communicator, both inside and outside the organization. You are given autonomy to look for new insights that benefit the organization and your personal development. You are able to gain insight into a complex problem and arrive at a well-founded judgement. You enjoy taking the lead in organisation-wide strategic projects.	T4.2, T4.3, T4.5 T2.2, T3.1, T3.3, T5.2, T6.5 T4.1, T4.2, T4.3 T2.2, T2.4, T3.1, T3.2 T3.2, T3.4, T4.2 T4.2, T4.3, T4.4, T4.5

Figure 1 – Print screen on ESCO interpretation

1.3.1. Demand of transferable skills

The transferable ESCO skills that the employers expressed a need for in job ads in February 2023 are summarized in **Erreur ! Source du renvoi introuvable.** and **Erreur ! Source du renvoi introuvable.** (group of skills).

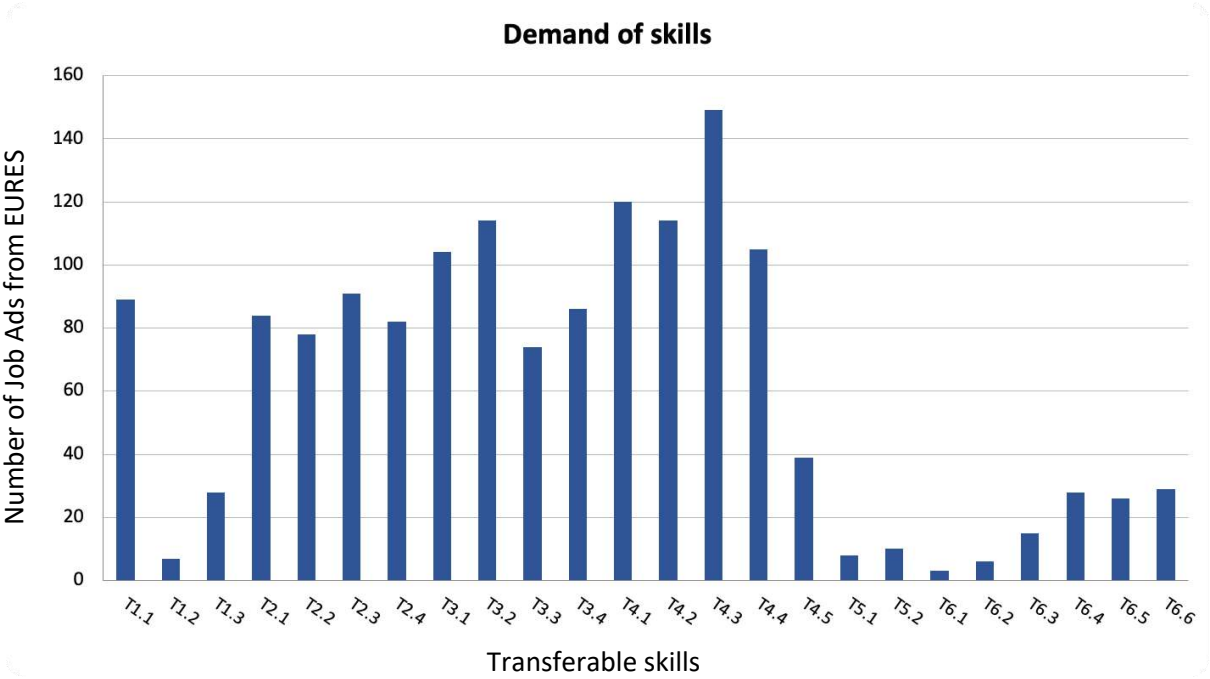

Figure 2 - Demand of skills

Figure 3 - Demand by group of skill

The skill most demanded by employers is the ability to collaborate in teams and networks (T4.3), while the lowest demand concerns the skills related to physical and manual competences.

1.4 Transferable skills offered by each partner HEI, listed by domain

The database on offer is constituted of the training offered by the HEIs which are part of the DocTalent4EU project:

- UPORTO
- ULim
- UiT
- UCA
- UAH
- TUASI
- HVL

Each partner listed the courses offered by their university and aligned each training course offered with the ESCO categorization of transferable skills developed. Each course can, therefore, be associated with the developing of one or several ESCO skills.

For each HEI, data was gathered in Excel, containing details as:

- Year
- Original name of the webinar/training
- Type of training (online, onsite, hybrid)
- English name of the webinar/training
- Name of the trainer
- Affiliation of the trainer
- Date of training/webinar
- Short description – original
- Short description – english
- ECTS_if available
- Microcredentials_if available
- Other forms of recognition (certificates etc)
- Duration - teaching hours
- Transferable skill gained (ESCO type)
- Transferable skill gained (ResearchComp type)

A total number of 226 courses were identified at consortium partners. Anyhow, it is worth mentioning that these courses are of different types and length, e.g., short webinars, traditional training, podcasts etc.

1.4.1. Offer of transferable skills

The ESCO transferable skills offered by each partner are summarized in **Erreur ! Source du renvoi introuvable.**. It can be seen from Figure 4 that the most intense training is offered by ULim, while the training is focused more on T2 and T4, as it can also be seen from Figure 5.

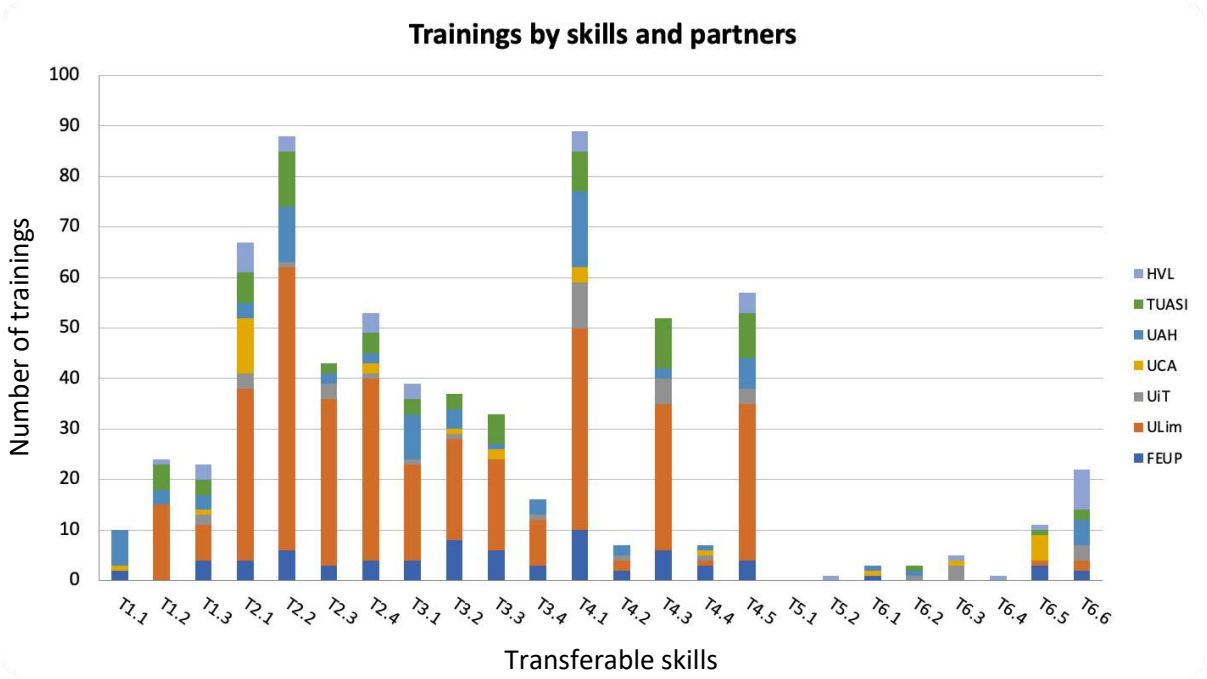

Figure 4 - Training by skills and partners

By grouping the training in the 6 categories of the ESCO classification, we obtain the results displayed in **Erreur ! Source du renvoi introuvable.**.

Figure 5 - Training by group of skills and partners

Refer to **Annex 1** to consult the list of ESCO skills and group of skills.

From those results we can see that the most taught group of skills are thinking skills and competences (T2) and social and communication skills and competences (T4), while the least developed skills are by far physical and manual skills and competences (T5). In terms of specific skills, the most included skills in the training offered by HEIs are *Planning and organising* (T2.2) and *Communicating* (T4.1).

Looking at the results given by each HEI, we can also see a stark difference in the number of trainings for each ESCO skills offered by ULim and the rest of the HEIs. While the other 5 partners listed between 40 and 80, ULim listed a total of 353 combined ESCO skills being developed in all the courses offered. In this database, ULim therefore offers more training than all the other HEIs combined, giving ULim a much higher weight in this analysis.

1.4.2. Comparison between offer and demand of skills

In this section a comparison in terms of HEIs training offer and job ads demand on transferable skills will be outlined.

Figure 6 shows side by side the level of offer and demand for each ESCO skill. The comparison is in percentages related to the total number of skills.

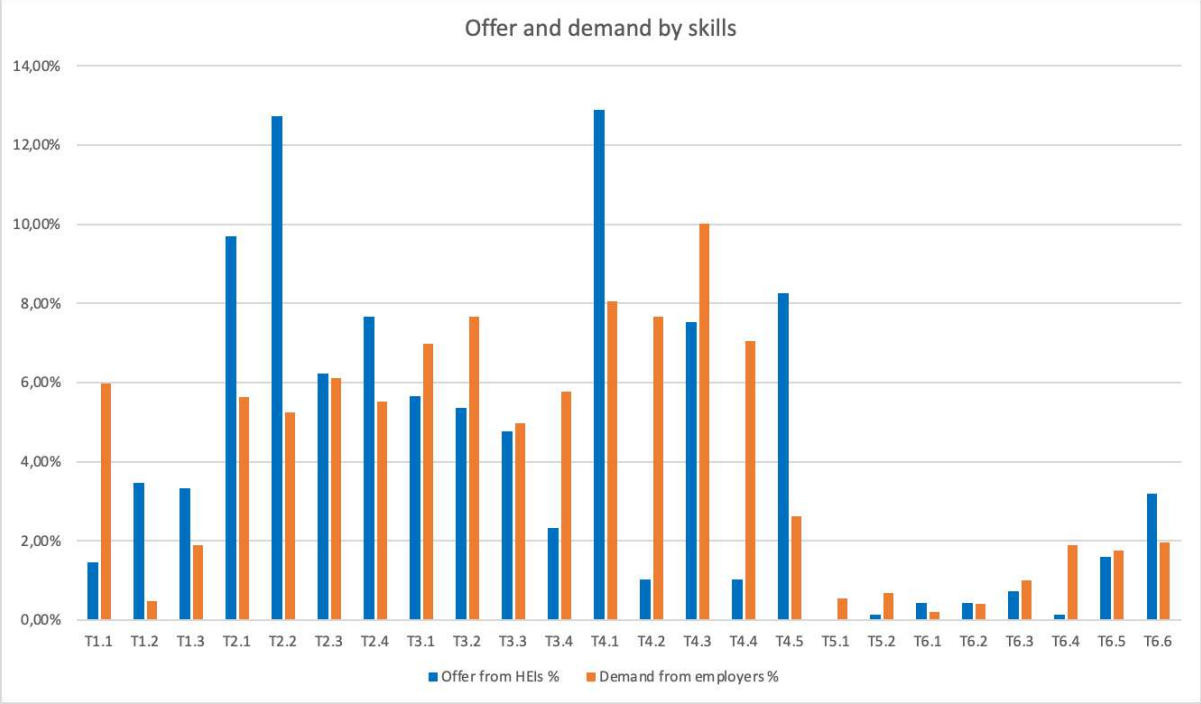

Figure 6 - Offer and demand by skill

Based on this, we can generate Figure 7, which shows the difference (in absolute terms) between the level of demand and the level of offer of skills.

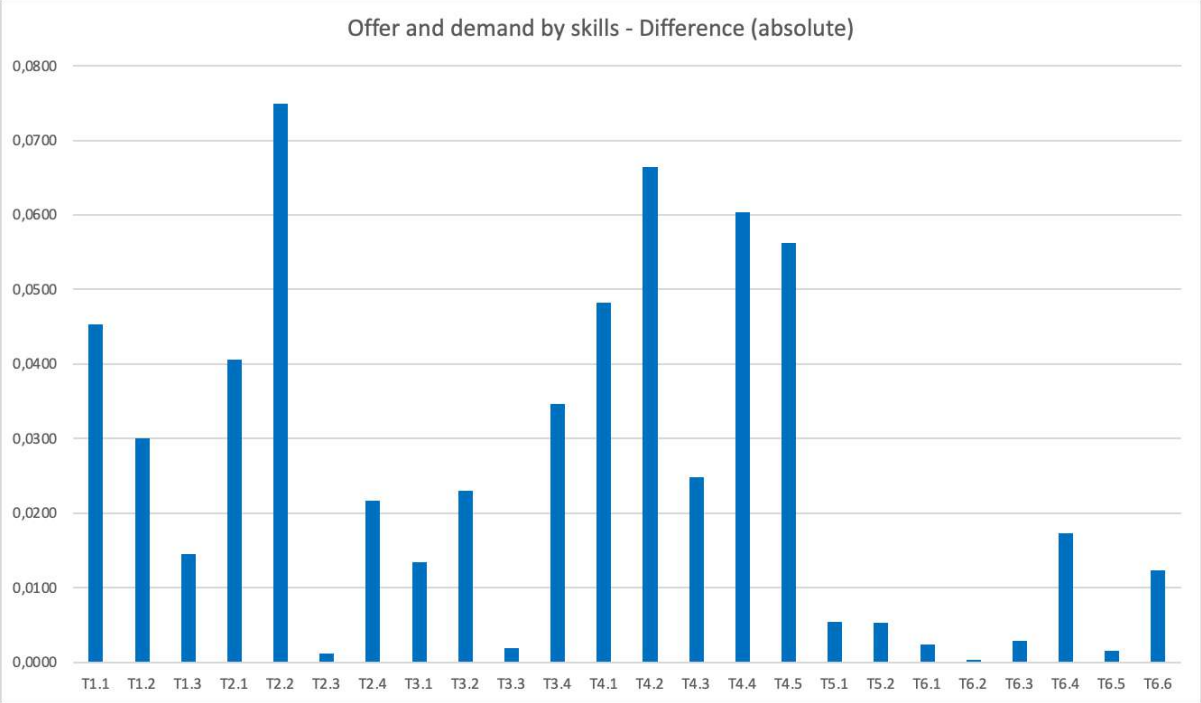

Figure 7 - Difference between offer and demand by skill (absolute)

Figure 7 highlights that the highest differences occur for T2.2 (planning and organizing), T4.2 (supporting others), T4.4 (leading others) and T 4.5 (following ethical code of conduct), that clearly identifies incongruity between offered training and market demand.

However, those differences do not have the same importance on the job market. A level of training higher than what employers is demanding does not impact employability while the opposite is not true. Therefore, Figure 8 shows the difference between demand and offer in relative terms, with positive values for the skills where the HEIs tend to offer less training than what employers are demanding.

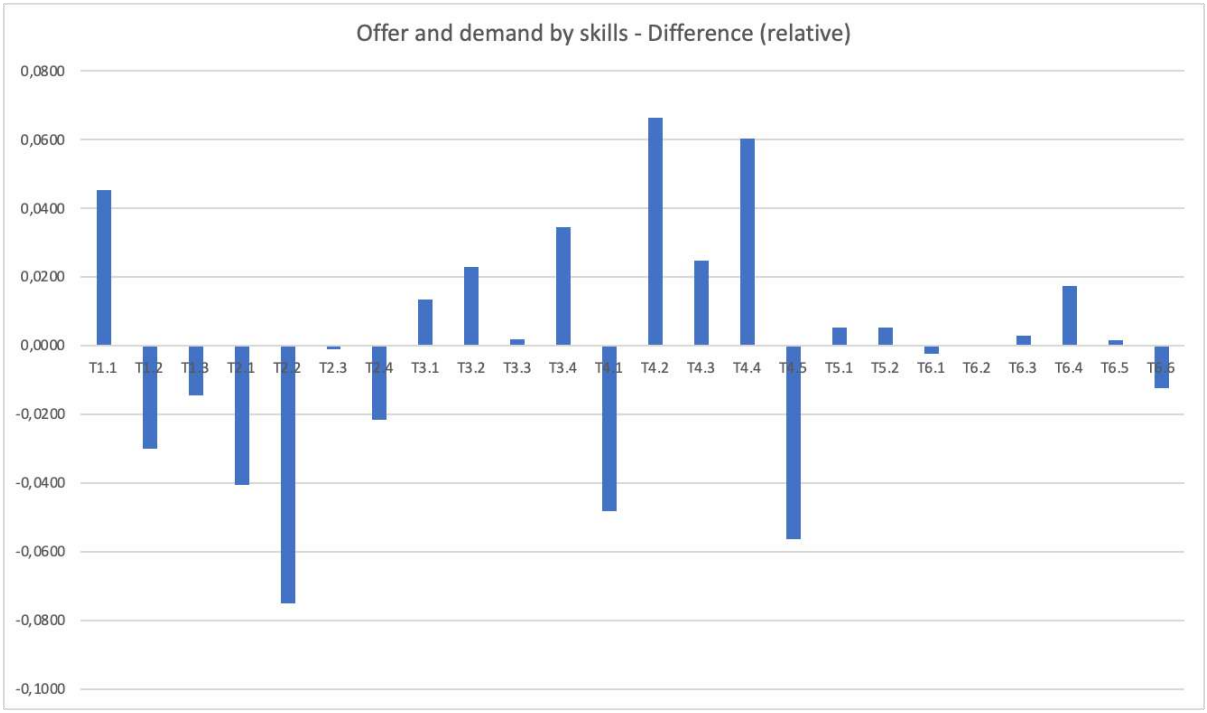

Figure 8 - Difference between offer and demand (relative)

Based on this analysis, the main lack of training in order to support employability of PhD graduates seems to concern primarily T4.2 (supporting others), T4.4 (leading others) and T1.1 (mastering language). Though, for T1.1, the lack of training could also reflect an absence of need, as PhD students usually have good language skills.

Please refer to **Annex 2** for all the details in terms of training offered by each partner. Data included in Annex 2 was collected from all partners and reflects the number of training offered to cover different skills, as defined by ESCO.

2. Gathering feedback from the non-academic sector on most needed transferable skills

2.1 Methodological approach used to gather feedback

As part of Task 1.2 “Gathering feedback from the non-academic sector" on most-needed transferable skills”, a methodology to gather coordinated feedback was developed. The methodology is conceived as a form of exploratory research involving an initial survey of industry partners followed by a meeting, colloquium or ‘breakfast meeting’ at which employers per DocTalent4EU project partners were provided with probing, open-ended questions to ascertain the most desired transferable or “soft skills” required of PhD candidates. Please refer to **Annex 3** for all the details in regard to the surveyed employers categorized by each partner.

As a synthesis, the methodology contains two types of feedback, identified as:

- feedback collected from surveys applied to traditional employers of each HEI

- feedback collected from meetings with several employers of a number of HEIs (i.e. interviews were conducted by TUIASI, UPorto and Ulim).

The developed methodology contains the steps to gather feedback from the non-academic sector on most needed transferable skills, together with pathways to achieve results and their discussion. Plus, the methodology developed in the course of the project included all the drafts for invitations and how to collect and correlate the feedback from non-academia. These drafts were discussed and agreed in the consortia in order to be able to achieve a good analysis.

2.1.1. Types of feedback: questionnaires

Steps to gather feedback from surveys are identified in the methodology as:

- ✓ Proposing a survey in English
- ✓ Translating the survey by each HEI into their native language, to be submitted to the non-academic partners of each HEI
- ✓ Collecting responses (direct survey, online survey etc, depending on each HEI ways of communication with their non academic partners)
- ✓ Translating the results into English
- ✓ Submit the results to task 1.2 Leader

The survey (see **Annex 4**) asked employers for vital feedback on what they consider to be the most required transversal skills and competences that PhD graduates should possess. The survey was based on European Skills, Competences, Qualifications and Occupations (ESCO) classification, as can be seen at: http://data.europa.eu/esco/skill/T. We will use this feedback, together with feedback from Task 1.1 “Mapping the transferable skills against ESCO” when designing and implementing training programmes and local talent management centres for our PhD candidates.

Survey questions used the ESCO classification of transversal skills and competences created by the European Commission to improve the supply of information on skills demand in the labour market. This will assist employers, universities, training providers and PhD candidates by giving up-to-date and standardised information on the skills and competences of doctoral researchers.

It is important that employers see the intended benefits for companies, NGOs, and industry that will accrue from the project. To that end, we have framed the survey in a way that allows employers to perceive that the DocTalent4EU project aims to develop PhD researchers' skills locally and to create greater synergies between academia and non-academic sectors.

The information gathered from the survey will help universities and other higher education institutions to orient courses towards the needs of the non-academic sector, where the majority of PhD graduates begin their careers, thus enhancing their employability and increase the levels of talent in the region.

The surveyed employers' distribution in terms of number, areas of activity are portrayed in Figure 9 and 10. With reference to Figure 10, the surveys were applied to the list of sectors to whom each HEI is having cooperation relationships. Each surveyed company declared its type and area of activity according to its disposal and completed the survey as is portrayed in Annex 4.

Company type								
	TUIASI	**UAH**	**Norway (UIT+HVL)**	**UPORTO**	**UCA**	**ULim**	**Total**	**Percentage**
Less than 50	1	6	1	4	7	3	**22**	24.72
100 - 50	2	1	3	3	0	4	**13**	14.61
500 - 100	3	1	3	1	3	5	**16**	17.98
1000 - 500	1	0	0	5	1	3	**10**	11.24
Over 1000	6	2	4	7	2	7	**28**	31.46
	13	**10**	**11**	**20**	**13**	**22**	**89**	**100**

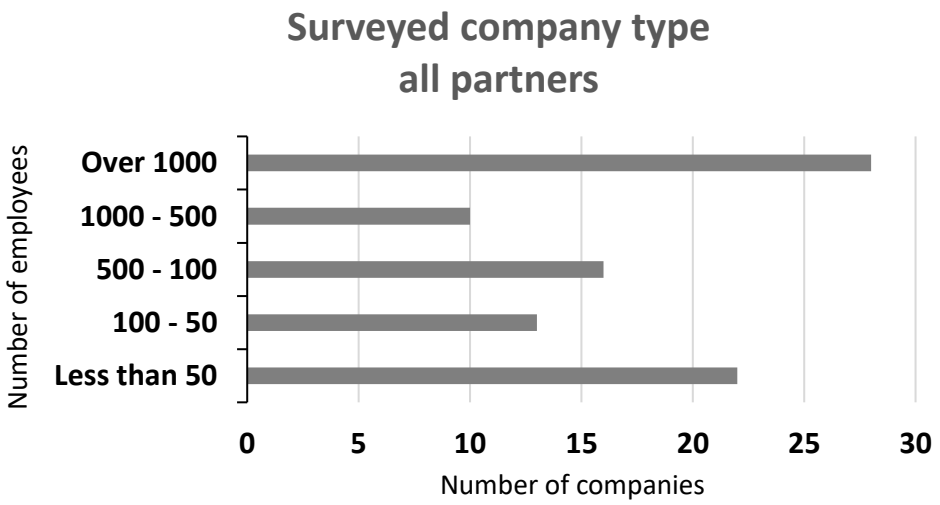

Figure 9-- Surveys: number of answers by each partner country and company type in terms of number of employees

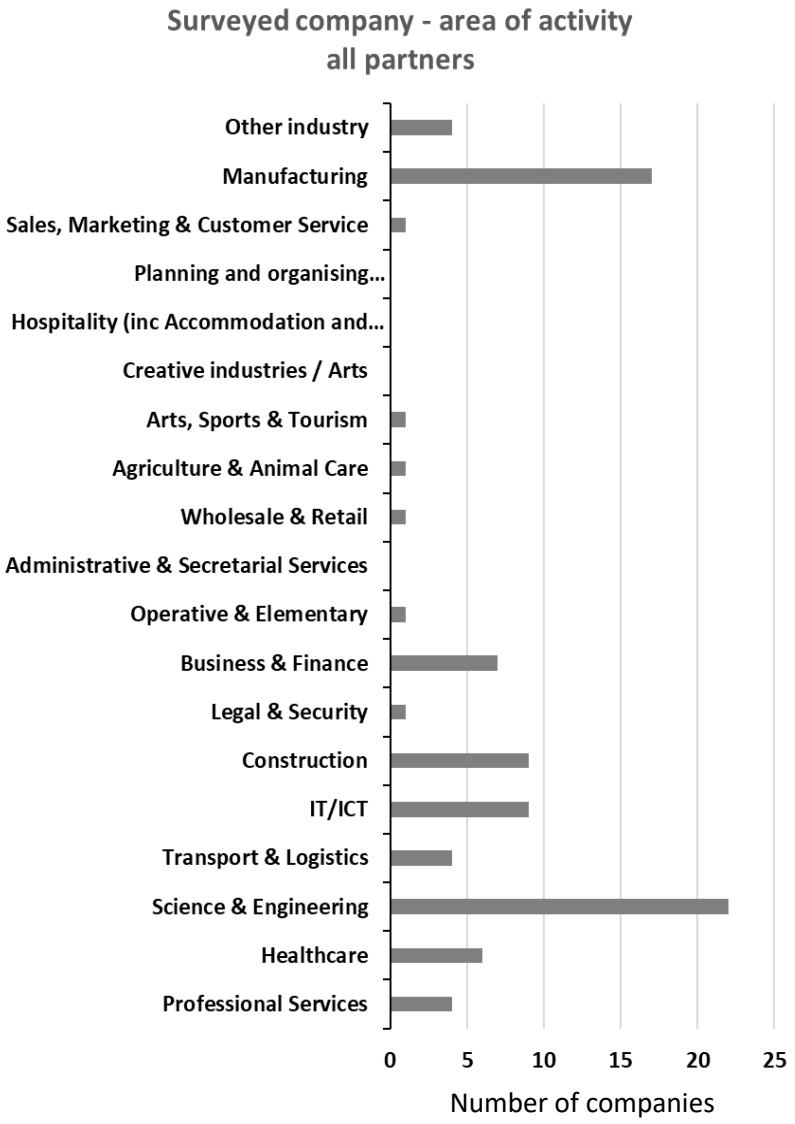

Figure 10 – Surveys: area of activity

2.1.2. Types of feedback: interviews

The interviews developed into this project were named as "Breakfast meetings" and a detailed methodology was also developed for this purpose, including interview plan, draft for the Meeting Agenda, draft for invitations etc.

Main steps were:

- ✓ Each HEI may organize an event to gather additional feedback, complementing the survey
- ✓ Attaining results
- ✓ Translating the results in English
- ✓ Submit the results to task 1.2 Leader

The interview plan was established as:

1. Introduction of the project DocTalent4EU – 10 minutes

2. Round Table of the guests – 2 minutes for every guest (short company presentation)

3. Presentation of the survey results – 10 minutes

4. Coordinated discussion – 30-40 minutes

Suggested topics for interview were highlighted as:

- ✓ *How do you perceive exactly the competences as are defined by ESCO – focused discussion on most demanded competences*
- ✓ *What is your opinion on the employability of doctoral candidates?*
- ✓ *What is your opinion on HEIs initiatives as for example: Creating the Talent Management Centres, Focused Training on transferable skills (soft skills), ECTS recognition of transferable skills?*
- ✓ *Discussion on courses proposal. Which are the first three choices?*
- ✓ *Is there any other kind of recognition system that can offer you increased trust in your future employee?*
- ✓ *Is it important that PhD graduates have supervision practices from academic and non-academic sectors?*
- ✓ *What are your recommendations for PhD programmes to make researchers more "industry- and society- ready"?*

5. Concluding remarks.

After collecting the results from each partner survey and disseminating the collective outcome to the Consortium partners, at least one of the partners invited respondents, to a "Breakfast Meeting" for a Focus Group to explore the issues involved in the survey in greater depth. The meetings were organized online, on-site or hybrid according to the needs and specificity of each HEI.

The respondents chosen were those considered most relevant to the completion of Task 1.2. Only those employers whose work practices and processes are research oriented and who intend to hire a PhD graduate in the future, were invited to this phase of Task 1.2.

This group of employers yielded rich data and feedback on the most needed transferable skills in the non-academic sector. The Focus Group format allowed partners to encourage in-depth group discussions and enhanced interaction among participants, thus unlocking new insights regarding transferable skills for PhD candidates that could otherwise remain undiscovered.

The focus group concept also allowed us to obtain deeper insights than those obtained by the initial survey, as we will have the opportunity to probe deeper into specific issues and topics with employers to explore hidden concerns and ideas.

Due to geographical and other concerns, the Focus Group concept was not possible for all partners to pursue. However, the methodology intends to allow for flexibility among partners and to be adapted in the best and most appropriate way to local circumstances.

In the case that more partners are organising "Breakfast Meeting" for a Focus Group in order to explore the issues involved in the survey in greater depth, all data were centralized by each partner, translated into English and submitted to the task leader, University of Limerick.

2.2 Feedback results

In this section an analysis of the received feedback is inserted. As was described in this document, feedback was collected by means of 2 paths:

- EURES database JobAds mapping (see Section 1.3 for details about the methodology of data collection),
- Surveys and Interviews (see Section 2.1 for details about the methodology of data collection).

In addition to the feedback attained directly from the employers, an analysis of the feedback from EURES platform is also inserted here, due to its wider relevance for this project.

Plus, the analysis was accomplished in regard to major categories from ESCO (i.e. T1, T2, T3 etc), as well as considering the minor categories (T1.1, T1.2 T1.3 etc) of transferable skills (see Annex 1 for major and minor categories as are defined in ESCO).

2.2.1. Feedback from EURES

EURES database was surveyed between February and April 2023 by collecting all data from JobAds that were dedicated to doctoral candidates. Around 300 job ads were collected, translated into English and then competences mapped to suit ESCO. From the Job Ads mapping, the most needed competences (see Figure 11 and Figure 12) resulted as:

T4.3 - collaborating in teams and networks (Alternative label: working with others, acting with others to achieve aims)

T4.1 – communicating (Alternative label: conversational skills, using language, symbols and text effectively; verbal skills, communication, communication skills, writing skills, argumentation skills)

T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)

T4.2 - supporting others (Alternative label: providing support to others, support others, helpfulness)

T4.4 - leading others

T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)

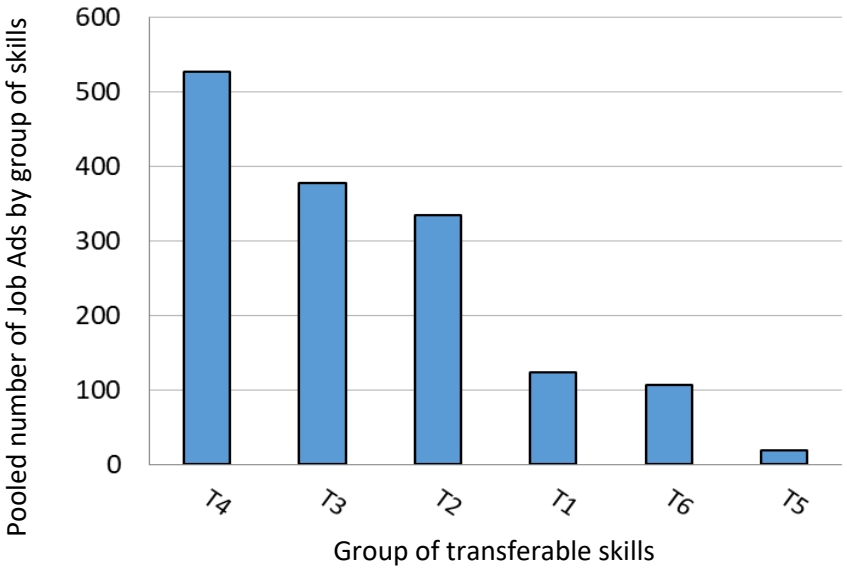

Figure 11– Most needed competences in terms of major categories – JobAds outcomes

Figure 12- Most needed competences in terms of minor categories- JobAds outcomes

From HEI training list results (see Figure 4 and Figure 5 – Section 1.4.5) it can see that the most taught group of skills are thinking skills and competences (T2) and social and communication skills and competences (T4), while the least demanded skills are by far physical and manual skills and competences (T5). In terms of specific skills, the most included skills in the training offered by HEIs are Planning and organising (T2.2) and Communicating (T4.1), which are broadly in line with the identified missing skills.

2.2.2 Feedback from surveys

The surveys were conducted over 3 months and each partner collected the feedback, that was later sent to the task coordinator. All partners, under the coordination of TUIASI, analysed the feedback received through the questionnaires to identify missing transferable skills - according to ESCO definition - needed in the non-academic sector.

An analysis of the companies surveyed, together with the results of the surveys are discussed further on, in connection with each country and as a summary for all project partners. The definition of competences can be found in **Annex 1.**

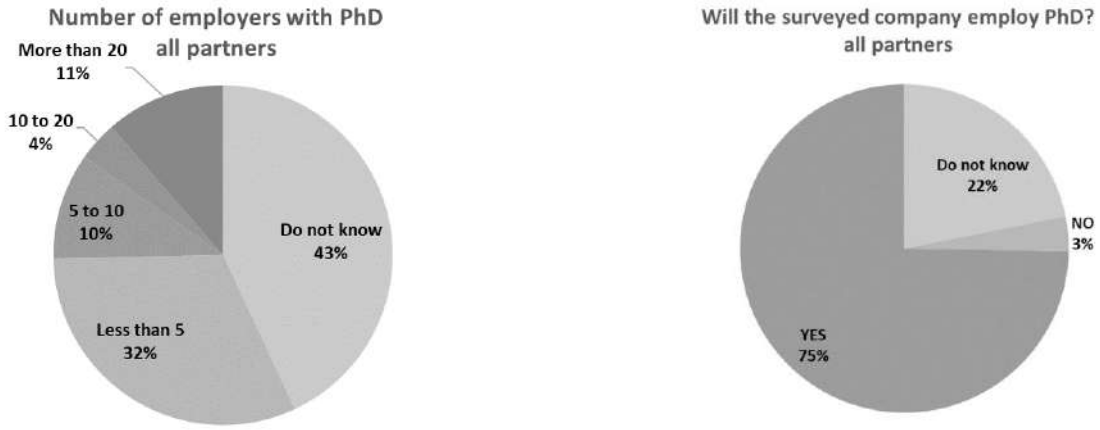

Figure 13– Surveys answers statistics: number of employers with PhD in non academia

In the next lines we will show the survey results for each partner in terms of percentages from the total amount of selected transferable skills. We found that this approach (i.e. in percentages related to the total of transferable skills) can be a better tool to visualize the relevance for each transferable skill. As a comment, if the percentage is high this means that the specific transferable skill was requested by a larger number of companies participating in the survey.

The summary of the results, per each partner country is depicted in Figures 14 – 19, respectively. Furthermore, a discussion per each partner is included in this report.

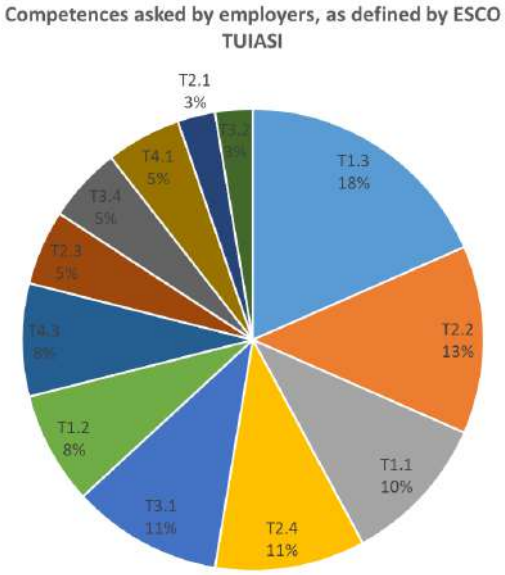

Figure 14– Surveys answers: most needed competences (TUIASI)

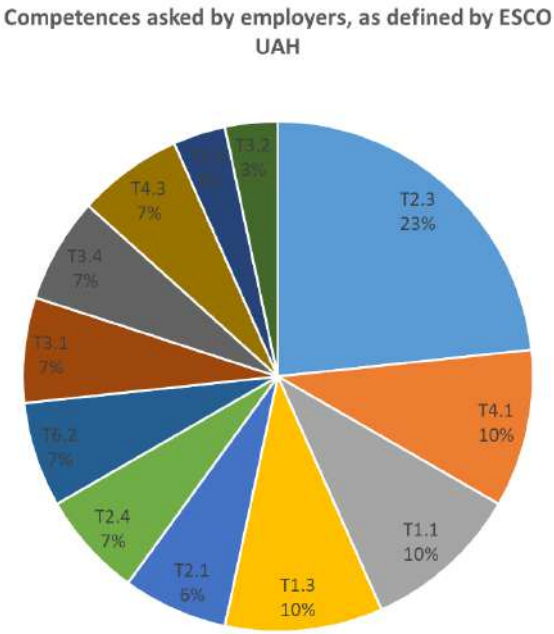

Figure 15– Surveys answers: most needed competences (UAH)

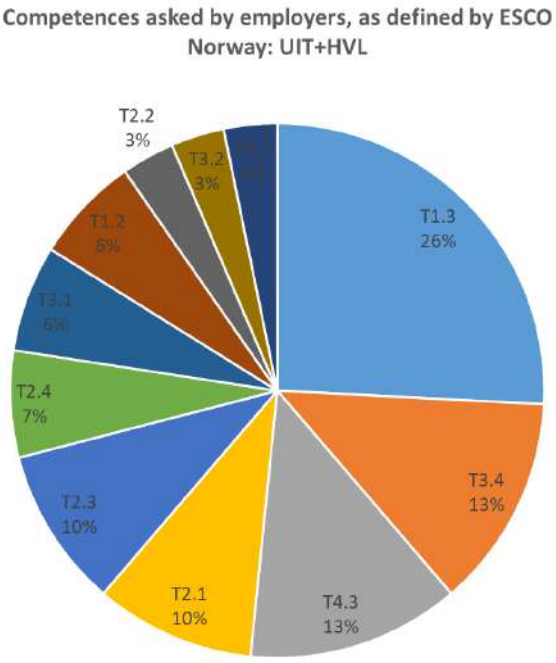

Figure 16– Surveys answers: most needed competences (UiT+HVL)

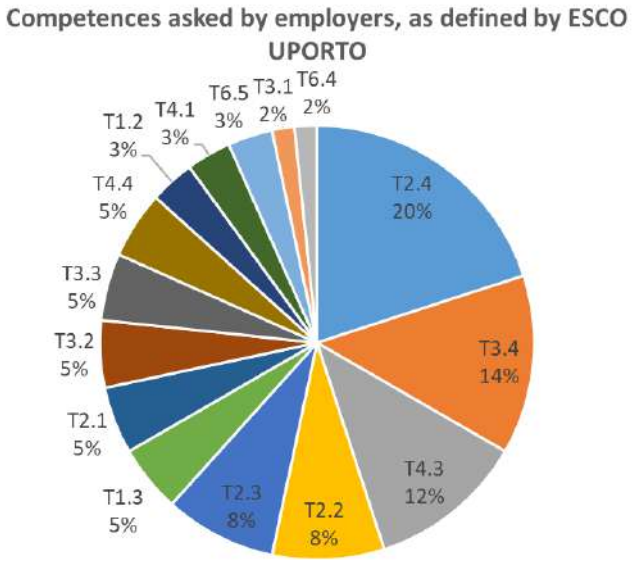

Figure 17– Surveys answers: most needed competences (UPORTO)

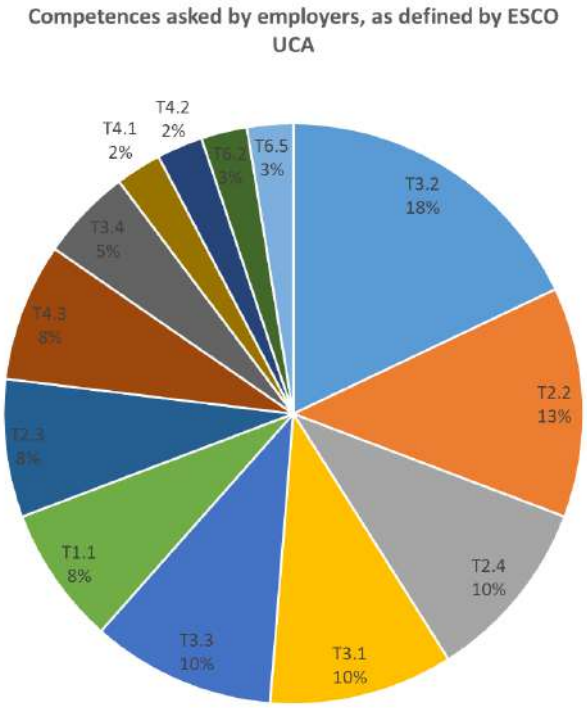

Figure 18 – Surveys answers: most needed competences (UCA)

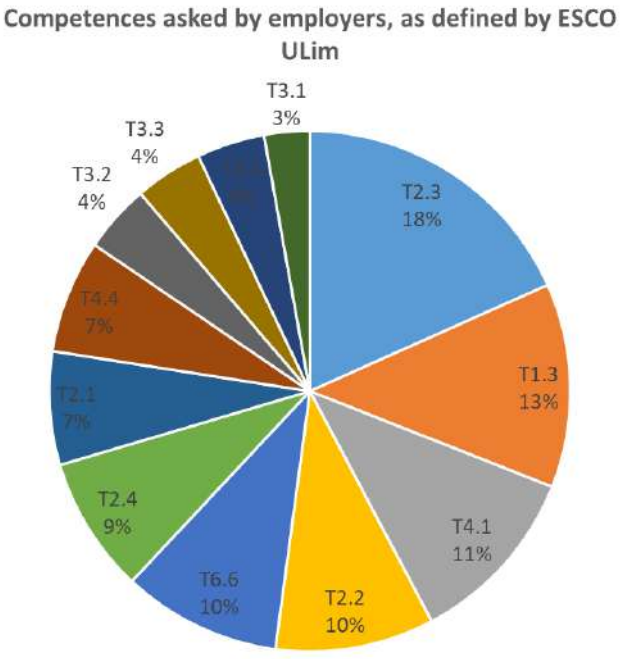

Figure 19– Surveys answers: most needed competences (ULim)

Following this analysis, the top competences identified in surveys from every partner are as follows:

Norway: UiT+HVL	**TUIASI**
T1.3 working with digital devices and applications T3.4 demonstrating willingness to learn T4.3 collaborating in teams and networks T2.1 processing information, ideas and concepts T2.3 dealing with problems T2.4 thinking creatively and innovatively T3.1 working efficiently	T1.3 working with digital devices and applications T2.2 planning and organising T1.1 mastering languages T2.4 thinking creatively and innovatively T3.1 working efficiently T4.3 collaborating in teams and networks T2.3 - dealing with problems T3.4 - demonstrating willingness to learn
UAH	**UPORTO**
T2.3 dealing with problems T4.1 communicating T1.1 mastering languages T1.3 working with digital devices and applications T2.1 processing information, ideas and concepts T2.4 thinking creatively and innovatively T3.1 working efficiently T3.4 demonstrating willingness to learn	T2.2 - planning and organising, T3.4 - demonstrating willingness to learn T4.3 - collaborating in teams and networks, T2.2 - planning and organising, T2.3 - dealing with problems, T1.3 - working with digital devices and applications, T2.1 - processing information, ideas and concepts, T3.2 - taking a proactive approach, T3.3 - maintaining a positive attitude T4.4 - leading others

UCA	ULim
T3.2 - taking a proactive approach T2.2 - planning and organising T2.4 thinking creatively and innovatively T1.1 mastering languages T3.1 working efficiently T3.3 - maintaining a positive attitude T4.3 - collaborating in teams and networks	T2.3 - dealing with problems T1.3 - working with digital devices and applications T4.1 - communicating T2.2 - planning and organising T6.6 - applying general knowledge

As a final outcome, if it centralizes the survey data for all partners, the results are in Figure 20 and 21. In Figure 20 it can see that the most demanded transferable skill (i.e. thus, the most relevant for a future employee) is T2 (thinking skills and competences), followed by T3 (self-management skills and competences) and T1 (core skills and competences).

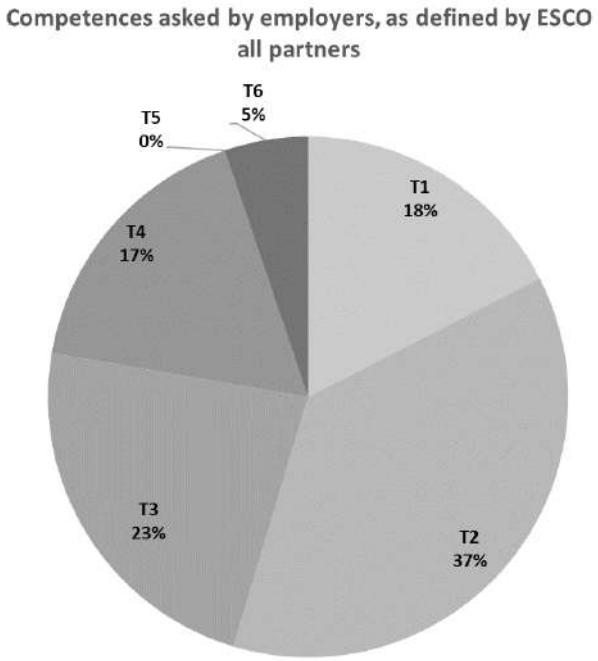

Figure 20– Surveys answers: most needed competences – large categories (all partners)

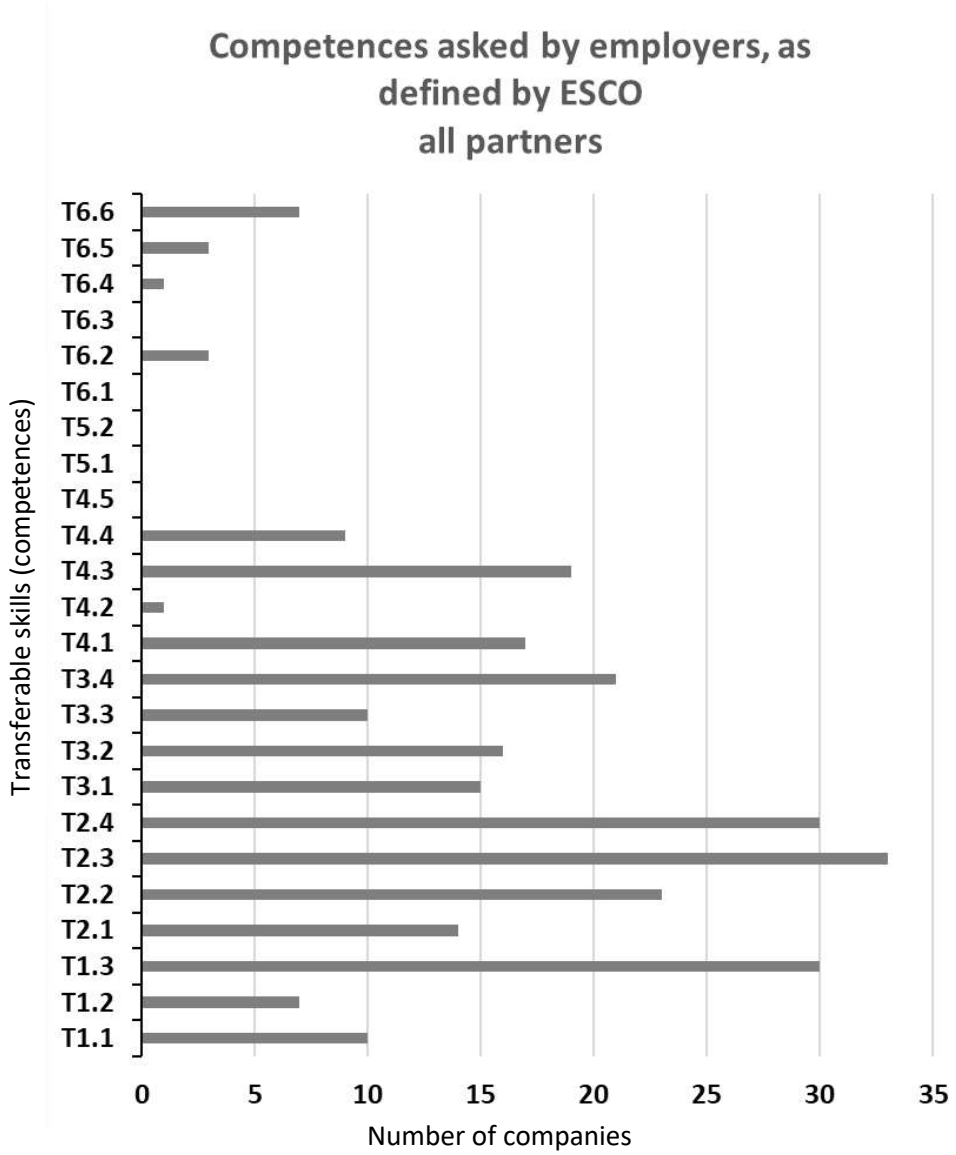

Figure 21– Surveys answers: most needed competences – subcategories (all partners)

In Figure 21 it can see that the most demanded minor transferable skill (i.e. thus, the most relevant for a future employee) is T2.3 - dealing with problems (12.27 % demand), followed by T1.3 - working with digital devices and applications and T2.4 - thinking creatively and innovatively (11.15 % demand).

2.2.3 Feedback from interviews

Interviews were performed by the consortium partners and the feedback collection template is inserted in **Annex 6**.

2.2.3.1. Interview performed by TUIASI

The interview at TUIASI premises was on July 3rd and ten companies were invited. Of the 10 invitations issued to employers, four large companies responded positively, demonstrating their willingness to

participate in the interview. Discussions were coordinated by Professor Alina Adriana Minea, together with the TUIASI team from DocTalent4EU project.

From the discussions and project result presentations the need for training was clearly identified, as well as the need of implementing a Talent Management Center inside academia.

All the companies interviewed hire engineers from a lot of domains, like electrical engineering, materials engineering, computer science, mechanical engineering, industrial engineering, chemical engineering etc.

Three of the four interviewed companies are dealing with talent management in the companies.

Three of the four interviewed companies are TUIASI ALUMNI and understand very well the HEI system.

All the interviewed companies hire doctoral students and have employees with PhDs. Plus, they want to work with TUIASI to train and discover talents and agree that this approach will ease companies' recruitment process.

In one of the companies, PhD graduates are treated separately at jobs interviews, for fear that an inexperienced recruiter would exclude them for that reason.

The transferable skill labelled as T1.3, related to digital skills was one of the most wanted one. One of the companies believes that the answers depended a lot on the staff structure of the responding companies. The younger generation is very digital, while older peers are making efforts to integrate.

Another invited company highlighted the relevance of written communication skills, such as, for example, the writing of an official e-mail. Training on the difference between informal and formal communication would be very useful. There is a need to introduce basic transversal skills (for example: communication through official messages) into training/courses.

On the other hand, one of the companies interviewed pointed out that the problem is not the lack of digital skills, but the structured way in which employees know how to use the software.

A general conclusion of the discussion was that the students are not aware that transferable skills are extremely important for their professional future.

Several detected issues:

There are companies that do not hire a candidate if they mention a PhD degree in their CV, but that is not the case within large companies; however, it occurs especially in small companies. It is about the maturity of the person responsible for hiring (i.e. sometimes it is the company owner and not a trained recruiter) and their ability to present such a candidate to their manager. A PhD degree may seem an overqualification for inexperienced recruiters and a valuable employee can thus be lost.

Suggestions resulted from the discussions:

- During the doctoral studies, there is enough time for soft skills training to be practiced. They should be mandatory, from 8 hours upwards. On the final diploma, it would be good for such skills to be mentioned, so that doctoral students are motivated to obtain them.
- In order to organize soft skills training external companies must be contacted, because they have people specialized in such training. On the one hand, in universities the development of certain skills depends a lot on the teacher's charisma. For this reason, it is better for universities to contact specialized external partners. On the other hand, universities need to have assessment tools designed for transferable skills assessment.
- Training addressed to educators / PhD advisors was discussed during the meeting and all guests admitted that this would be beneficial in the long term for HEI.
- Training needs to include exercises, feedback, interaction and not just teaching.
- HEI, with the help of the non-academia needs to raise awareness on the extreme relevance of transversal skills of the future employee and to emphasize self-learning and its relevance.

2.2.3.2. Interview performed by UPORTO

Five companies were contacted for the interview. At the time of the conclusion of this report, one company reacted positively and was interviewed.

The interview was conducted online on the 25th of July 2023. The company is an industrial unit in the manufacturing sector, employing a bit over 100 people. The company has research activity and employs 2 or 3 PhD holders.

The interviewee did not know the ESCO framework. For the company PhD holders have an added value in scientific activities. They are strong in deepening the questions and problems. It is possible to delegate more tasks related to scientific areas. PhDs have more difficulty communicating outside the scientific world and should simplify communication. There is a communicational overconfidence trying to be precise and seeking to be right instead of being pragmatic.

Creating the Talent Management Centres is a good initiative within the project. The contact point must be aware of individuality issues from PhD candidates as they are in a difficult position if they are asking for help. The service providers should be competent in sociology and psychology and with experience in the non-academic sector.

Relative to the training proposed by DocTalent4EU, Course #1 on Effective Communication and Negotiation is a must. Course #2 on Team working and Networking is hard to teach if not practicing. Relative to Course #3 on Personal Effectiveness and Leadership it is relevant to teach how to integrate in the company. To learn about the business and how they can help the business grow. To drop the scientific quest in favor of helping the company.

The DocTalent4EU credentials are a good initiative. Especially if they are connected to LinkedIn. It is easier to share and is a form of gamifying the CV. Paper certificates are obsolete.

The company highlighted that it is important that PhD graduates have supervision, namely through a mentoring program, involving the non-academic sector and alumni.

Finally, the interviewee recommended more training in finances and business. PhDs enter the labor market at an older age and with more maturity. They should have more business-oriented skills to understand financial indicators.

In conclusion, the main concerns highlighted in the interview are focused on the integration of PhDs in the business model of the company. On the one hand, PhDs are highly trained and more mature and therefore can afford higher responsibilities. On the other hand, they have a mismatch in terms of business-orientation and adaptability to quick changes in the business. Besides that, they should be better prepared to communicate their work to the general public.

2.2.3.3. Interview performed by ULim

Six companies were invited on September, 29-th by the University of Limerick for the interview. At the time of the conclusion of this report, all companies reacted positively and were interviewed. All the companies were interested in the DocTalent4EU project, outlining its relevance and importance for PhD candidates.

The meetings with company representatives were particularly enlightening. The overall response to DocTalent4EU was overwhelmingly positive. Representatives emphasized the importance of preparing doctoral candidates for employment in industry, not only because there are not enough academic positions available, but because the skills, competencies and expertise of PhD graduates is very highly regarded.

It was particularly beneficial to link up with partners for initiatives as part of the Doc Talent4EU project and to hear about what industry would like to see from us as an institution and from the project overall. Also, the initiative of setting up the Talent Management Centers in each HEI was welcomed and some of the companies offered their support to ULim. On the other hand, the digital credentials would be welcome and could be recognised (as was affirmed by the representative of one of the companies), although this would have to be verified elsewhere within the company. In regard to courses proposal, all the companies outlined the relevance of training in Team Working & Networking, Communication & Negotiation, Personal Effectiveness & Leadership.

The overall sense from discussions was that there are exciting initiatives taking place in industry, that jobs are becoming more exciting and challenging and that the skills that PhD candidates could bring to these highly skilled positions would be invaluable.

3. Analysis of the transferable skills needs

This document also offers an analysis of the needed transferable skills, by connecting the received feedback (i.e. feedback from Job Ads scrutinization, surveys, interviews, as well as training offered by HEIs).

3.1 Connecting feedback with ESCO list of transferable skills

If it discusses and connects the feedback received from different sources, as were explained in section 2, it is revealed that the most needed skills as were identified from the employer's survey are as portrayed in Figure 22, while in Figure 23 are the ones extracted from JobAds from EURES.

T2.3 - dealing with problems (Alternative label: problem solving skills, addressing problems and issues):	33
T1.3 - working with digital devices and applications (alt label: digital and technology-based competences, digital competencies, working with computers, computer literacy):	30
T2.4 - thinking creatively and innovatively (Alternative label: creating new information, concepts, ideas, products, processes; carrying out activities in innovative and creative ways)	30
T2.2 - planning and organising (Alternative label: organisational skills, planning abilities, planning activities, planning skills, work planning):	23
T3.4 - demonstrating willingness to learn (Alternative label: demonstrating self-management and self-reflection)	21
T4.3 - collaborating in teams and networks (Alternative label: working with others, acting with others to achieve aims)	19
T4.1 – communicating (Alternative label: conversational skills, using language, symbols and text effectively; verbal skils, communication, communication skills, writing skills, argumentation skills)	17
T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)	16
T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)	15
T2.1 - processing information, ideas and concepts(Alternative label: processing qualitative information, processing quantitative information, analysing and interpreting information, processing of information):	14
T1.1 - mastering languages (alt label: language proficiency, talent for languages, language skills, multilinguism)	10
T3.3 - maintaining a positive attitude (Alternative label: demonstrating resilience, managing negative factors in life and work)	10
T4.4 - leading others	9
T1.2 - working with numbers and measures (alt label: numeracy and mathematics, ability to understand and work with numbers, carrying out measurements)	7
T6.6 - applying general knowledge	7
T6.5 - applying entrepreneurial and financial skills and competences	3
T6.2 - applying environmental skills and competences	3

Figure 22 -Surveys answers: most needed competences, listed by frequency of appearance.

T4.3 - collaborating in teams and networks (Alternative label: working with others, acting with others to achieve aims)	149
T4.1 – communicating (Alternative label: conversational skills, using language, symbols and text effectively; verbal skils, communication, communication skills, writing skills, argumentation skills)	120
T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)	114
T4.2 - supporting others (Alternative label: providing support to others, support others, helpfulness)	114
T4.4 - leading others	105
T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)	104
T2.3 - dealing with problems (Alternative label: problem solving skills, addressing problems and issues):	91
T1.1 - mastering languages (alt label: language proficiency, talent for languages, language skills, multilinguism)	89
T3.4 - demonstrating willingness to learn (Alternative label: demonstrating self-management and self-reflection)	86
T2.1 - processing information, ideas and concepts(Alternative label: processing qualitative information, processing quantitative information, analysing and interpreting information, processing of information):	84
T2.4 - thinking creatively and innovatively (Alternative label: creating new information, concepts, ideas, products, processes; carrying out activities in innovative and creative ways)	82
T2.2 - planning and organising (Alternative label: organisational skills, planning abilities, planning activities, planning skills, work planning):	78
T3.3 - maintaining a positive attitude (Alternative label: demonstrating resilience, managing negative factors in life and work)	74

Figure 23– JobAds most needed competences, listed by frequency of appearance

In Figure 22 and Figure 23 the most needed transferable skills and competences are outlined, in terms of their number of appearance and it can be noticed that there are slight differences between the two figures. These differences appeared mainly due to the different understanding of these skills. It must remind here that in surveys all the skills as are defined in ESCO were inserted, while in the Job Ads mapping there was applied a subjective correspondence between the skills required by employers (i.e. using free words) and those defined in ESCO. Nevertheless, it can easily conclude that T1 (core skills and competences), T2 (thinking skills and competences) and T3 (self-management skills and competences), together with the ability to work in teams and networks are the most needed ones for future employees.

3.2 Analysis of the most relevant transferable skills and competences needs

Analyzing the most needed skills and competences as were identified in the performed scrutinization, we can conclude that the most relevant transferable skills and competences needed for HEIs graduates are:

T4.3 - **collaborating in teams and networks** (Alternative label: working with others, acting with others to achieve aims)

T3.1 - **working efficiently** (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)

T3.2 - **taking a proactive approach** (Alternative label: recognizing opportunities, be proactive, identify opportunities, proactive personality, recognize opportunities)

T4.1 – **communicating** (Alternative label: conversational skills, using language, symbols and text effectively; verbal skills, communication, communication skills, writing skills, argumentation skills)

The provided list is an intersection between employers' feedback and job ads mapping.

Plus, in Figure 23 an analysis of the transferable skills and competences is presented in comparison with the training offered by all HEIs involved in this project.

		Most wanted competences (survey+job ads)	Offered by trainings
T1.1 - mastering languages (alt label: language proficiency, talent for languages, language skills, multilinguism)	T1.1	x	very low
T1.2 - working with numbers and measures (alt label: numeracy and mathematics, ability to understand and work with numbers, carrying out measurements)	T1.2		low
T1.3 - working with digital devices and applications (alt label: digital and technology-based competences, digital competencies, working with computers, computer literacy):	T1.3	x	low
T2.1 - processing information, ideas and concepts(Alternative label: processing qualitative information, processing quantitative information, analysing and interpreting information, processing of information):	T2.1	x	high
T2.2 - planning and organising (Alternative label: organisational skills, planning abilities, planning activities, planning skills, work planning):	T2.2	x	high
T2.3 - dealing with problems (Alternative label: problem solving skills, addressing problems and issues):	T2.3	x	high
T2.4 - thinking creatively and innovatively (Alternative label: creating new information, concepts, ideas, products, processes; carrying out activities in innovative and creative ways)	T2.4	x	high
T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)	T3.1	x	low
T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)	T3.2	x	low
T3.3 - maintaining a positive attitude (Alternative label: demonstrating resilience, managing negative factors in life and work)	T3.3	x	low
T3.4 - demonstrating willingness to learn (Alternative label: demonstrating self-management and self-reflection)	T3.4	x	very low
T4.1 – communicating (Alternative label: conversational skills, using language, symbols and text effectively; verbal skils, communication, communication skills, writing skills, argumentation skills)	T4.1	x	high
T4.2 - supporting others (Alternative label: providing support to others, support others, helpfulness)	T4.2	x	very low
T4.3 - collaborating in teams and networks (Alternative label: working with others, acting with others to achieve aims)	T4.3	x	high
T4.4 - leading others	T4.4	x	very low
T4.5 - following ethical code of conduct (Alternative label: scruples, values, value orientation, morals, handling of values, ethics, beliefs)	T4.5		high

Figure 24– Transferable skills: needs and HEIs training offer

In Figure 24 it can be seen that HEIs offer very low training in mastering languages, demonstrating self-management skills, supporting others, as well as leadership. With blue color are identified the skills were there is training offered, but still needs improvement. For example: working with digital devices, working efficiently, taking a proactive approach etc.

3.3 List of the most relevant transferable skills and their description

Considering the analysis performed and after consortia discussion, we can propose a list of transferable skills to be covered by future training. The list is provided furthermore, together with each skill description.

List of proposed competences to be covered by training:

T1.1 - mastering languages (alt label: language proficiency, talent for languages, language skills, multilingualism)

T1.3 - working with digital devices and applications (alt label: digital and technology-based competences, digital competencies, working with computers, computer literacy):

T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)

T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)

T3.3 - maintaining a positive attitude (Alternative label: demonstrating resilience, managing negative factors in life and work)

T3.4 - demonstrating willingness to learn (Alternative label: demonstrating self-management and self-reflection)

T4.2 - supporting others (Alternative label: providing support to others, support others, helpfulness)

T4.4 - leading others

To cover the gap in the consortium training offer, these 8 skills will be addressed as a priority through the 3 courses that will be developed in the project. Considering the important need of transferable skills identified through the Top 10 from employers' survey and Top 10 from job ads, the consortium will also put an effort to address these skills to increase and/or update their own training offer and provide content for other universities where the offer is too low.

Course 1. Communication and Negotiation*

**Discussion between the partners and with early-career researchers' representatives (Eurodoc, AJC06) led us to rethink the title of Course 1. "Communication, Negotiation and Science Diplomacy". Indeed, Science Diplomacy is a burning topic, but the terminology is not well understood and seems confusing for PhD candidates. Therefore, the consortium decided to remove it from the title of the training while content about Science Diplomacy still will be provided.*

Collaboration between WP1 (led by TUASI) and WP2 (led by UAH) allowed us to progress on the skills that will be addressed in Course 1. "Communication and Negotiation". 7 skills among the 8 proposed competences to be covered by training will be addressed, as well as 70% of Top 10 from employers' survey and 90% of Top 10 from job adds (Figure 25). For the 2 other training courses, the same work will be achieved to ensure full coverage of the transferable skills most in demand.

	Transferable skills addressed		
Course	ESCO	Research Comp	Recognition system
Communication and Negotiation	T1.3[1,3], T2.1[1,2], T2.2[1], T2.3[1,2], T2.4[1], T3.1[2,3], T3.2[2,3], T3.3[3], T3.4[1,2,3], T4.1[1,2], T4.2[2,3], T4.3[1,2], T4.4[2,3], T6.3, T6.4, T6.5, T6.6	Managing research; Doing research; Cognitive abilities; Self-management; Working with others; Making an impact; Managing Research tools	**Module I (MOOC):** 1 Open badge (ULIM+UCA) **Module II+Module III:** 2 European Digital Credentials for learning (UCA/ULIM)
Teamworking and Networking	TBD	TBD	2 European Digital Credentials for learning (UAH/UiT)
Personal effectiveness and Leadership	TBD	TBD	2 European Digital Credentials for learning (UAH/UPORTO)

[1] = Top 10 from employers' survey, [2] = Top 10 from job ads, [3] = Most demanded and not significantly provided yet by the consortium; TBD = to be determined.

Figure 25: Transferable skills addressed through the three courses and their recognition system

As described in the GA, DocTalent4EU digital credentials will be created to increase the recognition of the transferable skills that will be acquired by the participants through the different training (Figure 25). The two options that will be experimented on are the distribution of Open Badges and the use of European Digital Credentials for Learning.

Open Badges

Open Badges are visual representations of skills or achievements earned by an individual through various learning experiences, such as completing a course, acquiring a new skill, volunteering, attending workshops, or demonstrating expertise in a specific area. These badges are digital images that typically contain metadata, including information about the issuer, the criteria for earning the badge, the date of issuance, and any evidence or artifacts related to the achievement. Badges can be issued, earned, and managed by everybody, using a certified Open Badges platform.

European Digital Credentials for Learning

EuroPass definition: “European Digital Credentials for learning (EDCs) are standardized tamperproof electronic documents describing that their owner has certain skills or has achieved certain learning outcomes through formal, non-formal or informal learning context. EDCs are typically used to qualify for job positions, university placements and more. They are legally equivalent to paper-based certificates in all Members of the European Education Area. In practice, they could be a digital version of your university diploma, course certificate, or any other type of credential."

Based on our recent discussion, the consortium agreed that European Digital Credentials for Learning are the most relevant to recognize transferable skills acquired through formal training. It offers a more stable, official, and secure support for the university. This should give more credibility to the PhD candidates getting the credentials. Concerning informal training, the project will focus on Open Badges which are an efficient way to highlight specific skills in digital curricula and professional network.

In WP3 (led by UPORTO), ULIM and UCA will create an Open Badge that will be issued to the participant of the MOOC (Module I of Course I “Communication and Negotiation”). For Module II and Module III of Course 1, as well as for Course 2 and 3, European Digital Credentials for Learning will be issued. Designs for Open badge and EDCs already have been provided by EUF (D6.4, Figure 26).

Figure 26: Design proposed for the Open badge (left) and EDC (right)

In addition to the 7 digital credentials created by the partners for the 3 Courses, 3 other digital credentials will be created to recognize transferable skills acquired through research activities of PhD candidates during their thesis (D3.1).

4. Concluding remarks

This document describes the work performed by all partners in connection with defining the most needed transferable skills for PhD students.

Feedback was collected from different sources and from different areas of activity and a comprehensive analysis was performed in order to be able to create the referential for this project.

As a conclusion, it might say that even if training is intensively offered by most HEIs, there are still competences that can be successfully covered by further training. Plus, an urgent need for coordinated and better oriented training was clearly identified. The transferable skills can be further developed by HEIs or associated partners by means of online, onsite or hybrid training.

As a special conclusion from “Breakfast Meetings” (i.e., interviews with the non-academic partners of each HEI) it can say that problem solving must be a must in all the training applied to doctoral students, as well as to young researchers.

References

Chadha, D. (2006) 'A curriculum model for transferable skills development', Engineering Education, 1(1), pp. 19–24. Available at: https://doi.org/10.11120/ened.2006.01010019.

CHAMELEONS: Championing A Multi-Sectoral Education and Learning Experience to Open New pathways for doctoral Students

Christensen, P.K.K. (2005) 'Bologna Seminar on "Doctoral Programmes for the European Knowledge Society"'. Available at: https://eua.eu/downloads/publications/salzburg%20recommendations%202005.pdf.

Cui, Q. and Harshman, J. (2020) 'Qualitative Investigation to Identify the Knowledge and Skills That U.S.-Trained Doctoral Chemists Require in Typical Chemistry Positions', Journal of Chemical Education, 97(5), pp. 1247–1255. Available at: https://doi.org/10.1021/acs.jchemed.9b01027.

Cusack, T. et al. (2021) 'INTERDISCIPLINARY AND INTERSECTORAL DOCTORAL EDUCATION DESIGNED TO IMPROVE GRADUATE EMPLOYABILITY', in Education and New Developments 2021. International Conference on Education and New Developments, inScience Press, pp. 643–645. Available at: https://doi.org/10.36315/2021end136.

DocEnhance 2022: https://docenhance.eu/stakeholder-evaluation-workshop/

DocEnhance: European project which aims at enhancing the teaching and integration of transferable skills into PhD programs.

ESCO: European Skills, Competences, Qualifications and Occupations. Through this listing of skills and competences, the goal is to provide a better recognition of research professions, by offering researchers a better understanding of the skills and competences they need.

European commission et al. (2022) Knowledge ecosystems in the new ERA: using a competence based approach for career development in academia and beyond. LU: Publications Office. Available at: https://data.europa.eu/doi/10.2777/150763 (Accessed: 6 February 2023).

European Commission. Directorate General for Research and Innovation. et al. (2021) MORE4: support data collection and analysis concerning mobility patterns and career paths of researchers. LU: Publications Office. Available at: https://data.europa.eu/doi/10.2777/645537 (Accessed: 16 February 2023).

European Commission. Directorate General for Research and Innovation. et al. (2022) Knowledge ecosystems in the new ERA: talent circulation and intersectoral mobility: pathways for a balanced talent circulation in EU. LU: Publications Office. Available at: https://data.europa.eu/doi/10.2777/83842 (Accessed: 9 February 2023).

Guerci, E. et al. (2022) Empowering students' awareness for a personalized career development: an approach to discover, experiment, and learn. 1st edition. Warsaw: Wydawnictwa Uniwersytetu Warszawskiego.

Heckman, J.J. and Kautz, T. (2012) 'Hard evidence on soft skills', Labour Economics, 19(4), pp. 451–464. Available at: https://doi.org/10.1016/j.labeco.2012.05.014.

ISCO: International Standard Classification of Occupations

Karatzia, M. (2020) 'What comes after a PhD? Findings from the DocEnhance survey of doctorate holders on their employment situation, skills match, and the value of the doctorate'.

Leniston, N. and Mountford, N. (2021) 'Born or made - Can interdisciplinary and intersectoral doctorate education create institutional entrepreneurs? A systematic review', in 7th International Conference on Higher Education Advances (HEAd'21). Seventh International Conference on Higher Education Advances, Universitat Politècnica de València. Available at: https://doi.org/10.4995/HEAd21.2021.12960.

MyAcademicID consortium (2020) MyAcademicID Blueprint Architecture. Available at: https://uni-foundation.eu/uploads/2020_MyAID_Blueprint_Architecture.pdf (Accessed: 2 January 2023).

Nerad, M. and Evans, B. (2014) Globalization and Its Impacts on the Quality of PhD Education: Forces and Forms in Doctoral Education Worldwide. Rotterdam: SensePublishers. Available at: https://doi.org/10.1007/978-94-6209-569-4.

New initiatives to empower research careers and to strengthen the European Research Area: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_3807, July 2023

O'Carroll, C. et al. (2012) 'The PhD in Europe: Developing a System of Doctoral Training That Will Increase the Internationalisation of Universities', in A. Curaj et al. (eds) European Higher Education at the Crossroads. Dordrecht: Springer Netherlands, pp. 461–484. Available at: https://doi.org/10.1007/978-94-007-3937-6_26.

OECD (2016) OECD Science, Technology and Innovation Outlook 2016. OECD (OECD Science, Technology and Innovation Outlook). Available at: https://doi.org/10.1787/sti_in_outlook-2016-en.

OECD: Organisation for Economic Co-operation and Development

ResearchComp: European Competence Framework for Researchers. This project aims to enable large recognition of skills and career development opportunities throughout the researchers' careers: https://research-and-innovation.ec.europa.eu/jobs-research/researchcomp-european-competence-framework-researchers_en

UNESCO: United Nations Educational, Scientific and Cultural Organization

Annex 1: ESCO Skills

T1 - core skills and competences
T1.1 - mastering languages (alt label: language proficiency, talent for languages, language skills, multilinguism)
T1.2 - working with numbers and measures (alt label: numeracy and mathematics, ability to understand and work with numbers, carrying out measurements)
T1.3 - working with digital devices and applications (alt label: digital and technology-based competences, digital competencies, working with computers, computer literacy): apply basic programming skills apply digital security measures conduct web searches create digital content manage digital identity operate digital hardware use communication and collaboration software
T2 - thinking skills and competences
T2.1 - processing information, ideas and concepts (Alternative label: processing qualitative information, processing quantitative information, analysing and interpreting information, processing of information): memorize information think analytically think critically think holistically think quickly
T2.2 - planning and organising (Alternative label: organisational skills, planning abilities, planning activities, planning skills, work planning): organize information, objects and resources plan
T2.3 - dealing with problems (Alternative label: problem solving skills, addressing problems and issues): identify problems solve problems
T2.4 - thinking creatively and innovatively (Alternative label: creating new information, concepts, ideas, products, processes; carrying out activities in innovative and creative ways) improvise think creatively think innovately
T3 - self-management skills and competences

T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)
attend to detail
maintain concentration for long periods
manage quality
manage time
meet commitments
work efficiently
work independently
T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)
assume responsibility
make decisions
manage personal progression
show commitment
show determination
show initiative
T3.3 - maintaining a positive attitude (Alternative label: demonstrating resilience, managing negative factors in life and work)
approach challenges positively
cope with stress
cope with uncertainty
manage frustration
show confidence
T3.4 - demonstrating willingness to learn (Alternative label: demonstrating self-management and self-reflection)
accept criticism and guidance
adapt to change
demonstrate curiosity
demonstrate willingness to learn
exercise self-reflection
keep an open mind
T4 - social and communication skills and competences
T4.1 – communicating (Alternative label: conversational skills, using language, symbols and text effectively; verbal skills, communication, communication skills, writing skills, argumentation skills)
address an audience
moderate a discussion
negotiate compromises
promote ideas, products, services
report facts
resolve conflicts

T4.2 - supporting others (Alternative label: providing support to others, support others, helpfulness)
advise others
ensure customer orientation
instruct others
show empathy
T4.3 - collaborating in teams and networks (Alternative label: working with others, acting with others to achieve aims)
build networks
demonstrate intercultural competence
work in teams
T4.4 - leading others
build team spirit
delegate responsibilities
lead others
motivate others
T4.5 - following ethical code of conduct (Alternative label: scruples, values, value orientation, morals, handling of values, ethics, beliefs)
comply with regulations
demonstrate loyalty
demonstrate trustworthiness
respect confidentiality obligations
T5 - physical and manual skills and competences
T5.1 - manipulating and controlling objects and equipment (Alternative label: lifting, moving and placing objects, performing physical tasks and activities)
move objects
use equipment, tools or technology with precision
T5.2 - responding to physical circumstances (demonstrating physical strength, demonstrating physical fitness, demonstrating endurance)
adjust to physical demands
react to physical changes or hazards
T6 - life skills and competences
T6.1 - applying health-related skills and competences
apply hygiene standards
demonstrate awareness of health risks
maintain physical fitness
maintain psychological well-being
make an informed use of the health-care system
manage chronic health conditions
protect the health of others

T6.2 - applying environmental skills and competences
adopt ways to foster biodiversity and animal welfare
adopt ways to reduce negative impact of consumption
adopt ways to reduce pollution
engage others in environment friendly behaviors
evaluate environmental impact of personal behavior
T6.3 - applying civic skills and competences
critically evaluate information and its sources
exercise rights and responsibilities
participate actively in civic life
promote the principles of democracy and rule of law
respect the diversity of cultural values and norms
T6.4 - applying cultural skills and competences
appreciate diverse cultural and artistic expression
express yourself creatively
T6.5 - applying entrepreneurial and financial skills and competences
manage financial and material resources
show entrepreneurial spirit
T6.6 - applying general knowledge
apply knowledge of philosophy, ethics and religion
apply knowledge of science, technology and engineering
apply knowledge of social sciences and humanities

Annex 2: Database of skills offered through courses offered by each HEI partner

ESCO skill name	ESCO skill code	Number of training courses							
		UPORTO	ULim	UiT	UCA	UAH	TUASI	HVL	Total
T1.1 - mastering languages (alt label: language proficiency, talent for languages, language skills, multilingualism)	T1.1	2	0	0	1	7	0	0	10
T1.2 - working with numbers and measures (alt label: numeracy and mathematics, ability to understand and work with numbers, carrying out measurements)	T1.2	0	15	0	0	3	5	1	24
T1.3 - working with digital devices and applications (alt label: digital and technology-based competences, digital competencies, working with computers, computer literacy):	T1.3	4	7	2	1	3	3	3	23
T2.1 - processing information, ideas and concepts (Alternative label: processing qualitative information, processing quantitative information, analysing and interpreting information, processing of information):	T2.1	4	34	3	11	3	6	6	67
T2.2 - planning and organising (Alternative label: organisational skills, planning abilities, planning activities, planning skills, work planning):	T2.2	6	56	1	0	11	11	3	88
T2.3 - dealing with problems (Alternative label: problem solving skills, addressing problems and issues):	T2.3	3	33	3	0	2	2	0	43

T2.4 - thinking creatively and innovatively (Alternative label: creating new information, concepts, ideas, products, processes; carrying out activities in innovative and creative ways)	T2.4	4	36	1	2	2	4	4	53
T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)	T3.1	4	19	1	0	9	3	3	39
T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)	T3.2	8	20	1	1	4	3	0	37
T3.3 - maintaining a positive attitude (Alternative label: demonstrating resilience, managing negative factors in life and work)	T3.3	6	18	0	2	1	6	0	33
T3.4 - demonstrating willingness to learn (Alternative label: demonstrating self-management and self-reflection)	T3.4	3	9	1	0	3	0	0	16
T4.1 – communicating (Alternative label: conversational skills, using language, symbols and text effectively; verbal skills, communication, communication skills, writing skills, argumentation skills)	T4.1	10	40	9	3	15	8	4	89
T4.2 - supporting others (Alternative label: providing	T4.2	2	2	1	0	2	0	0	7

support to others, support others, helpfulness)									
T4.3 - collaborating in teams and networks (Alternative label: working with others, acting with others to achieve aims)	T4.3	6	29	5	0	2	10	0	52
T4.4 - leading others	T4.4	3	1	1	1	1	0	0	7
T4.5 - following ethical code of conduct (Alternative label: scruples, values, value orientation, morals, handling of values, ethics, beliefs)	T4.5	4	31	3	0	6	9	4	57
T5.1 - manipulating and controlling objects and equipment (Alternative label: lifting, moving and placing objects, performing physical tasks and activities)	T5.1	0	0	0	0	0	0	0	0
T5.2 - responding to physical circumstances (demonstrating physical strength, demonstrating physical fitness, demonstrating endurance)	T5.2	0	0	0	0	0	0	1	1
T6.1 - applying health-related skills and competences	T6.1	1	0	0	1	1	0	0	3
T6.2 - applying environmental skills and competences	T6.2	0	0	1	0	1	1	0	3
T6.3 - applying civic skills and competences	T6.3	0	0	3	1	0	0	1	5
T6.4 - applying cultural skills and competences	T6.4	0	0	0	0	0	0	1	1
T6.5 - applying entrepreneurial and financial skills and competences	T6.5	3	1	0	5	0	1	1	11

T6.6 - applying general knowledge	T6.6	2	2	3	0	5	2	8	22
Total		75	353	39	29	81	74	40	691

ESCO skill name	ESCO skill code	Offer from HEIs (number of training courses)	Offer from HEIs (number of training courses) %
T1.1 - mastering languages (alt label: language proficiency, talent for languages, language skills, multilingualism)	T1.1	10	1.45%
T1.2 - working with numbers and measures (alt label: numeracy and mathematics, ability to understand and work with numbers, carrying out measurements)	T1.2	24	3.47%
T1.3 - working with digital devices and applications (alt label: digital and technology-based competences, digital competencies, working with computers, computer literacy):	T1.3	23	3.33%
T2.1 - processing information, ideas and concepts (Alternative label: processing qualitative information, processing quantitative information, analysing and interpreting information, processing of information):	T2.1	67	9.70%
T2.2 - planning and organising (Alternative label: organisational skills, planning abilities, planning activities, planning skills, work planning):	T2.2	88	12.74%
T2.3 - dealing with problems (Alternative label: problem solving skills, addressing problems and issues):	T2.3	43	6.22%
T2.4 - thinking creatively and innovatively (Alternative label: creating new information, concepts, ideas, products, processes; carrying out activities in innovative and creative ways)	T2.4	53	7.67%
T3.1 - working efficiently (Alternative label: efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)	T3.1	39	5.64%

T3.2 - taking a proactive approach (Alternative label: recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)	T3.2	37	5.35%
T3.3 - maintaining a positive attitude (Alternative label: demonstrating resilience, managing negative factors in life and work)	T3.3	33	4.78%
T3.4 - demonstrating willingness to learn (Alternative label: demonstrating self-management and self-reflection)	T3.4	16	2.32%
T4.1 – communicating (Alternative label: conversational skills, using language, symbols and text effectively; verbal skills, communication, communication skills, writing skills, argumentation skills)	T4.1	89	12.88%
T4.2 - supporting others (Alternative label: providing support to others, support others, helpfulness)	T4.2	7	1.01%
T4.3 - collaborating in teams and networks (Alternative label: working with others, acting with others to achieve aims)	T4.3	52	7.53%
T4.4 - leading others	T4.4	7	1.01%
T4.5 - following ethical code of conduct (Alternative label: scruples, values, value orientation, morals, handling of values, ethics, beliefs)	T4.5	57	8.25%
T5.1 - manipulating and controlling objects and equipment (Alternative label: lifting, moving and placing objects, performing physical tasks and activities)	T5.1	0	0.00%
T5.2 - responding to physical circumstances (demonstrating physical strength, demonstrating physical fitness, demonstrating endurance)	T5.2	1	0.14%
T6.1 - applying health-related skills and competences	T6.1	3	0.43%
T6.2 - applying environmental skills and competences	T6.2	3	0.43%
T6.3 - applying civic skills and competences	T6.3	5	0.72%
T6.4 - applying cultural skills and competences	T6.4	1	0.14%
T6.5 - applying entrepreneurial and financial skills and competences	T6.5	11	1.59%
T6.6 - applying general knowledge	T6.6	22	3.18%

Total		**691**	

ESCO skill name	ESCO skill code	Offer from HEIs(number of training courses)	Offer from HEIs(number of training courses) %
T1 - core skills and competences	T1	57	8.25
T2 - thinking skills and competences	T2	251	36.32
T3 - self-management skills and competences	T3	125	18.09
T4 - social and communication skills and competences	T4	212	30.68
T5 - physical and manual skills and competences	T5	1	0.14
T6 - life skills and competences	T6	45	6.51
Total		691	100

Annex 3: Database with employers, listed by each partner country

List of employers as defined by UAH

Company	Website	Doctoral area	Company sector of activity	Key contact from the Doc Talent4EU project	Does company has R&D preoccupation?	Company size
ALGAENERGY	https://www.algaenergy.com	Biology; Chemistry	Biotechnology	Ignacio Bravo	Yes	small
ALODIA	https://alodiafarmaceutica.com/	Pharmacy; Chemistry	Pharma	Ignacio Bravo	Yes	medium
BERLIMED S.A.	bayer.com	Pharmacy; Chemistry	Pharma	Ignacio Bravo	Yes	medium
Complutum Tecnologías de la Información Geográfica S.L.	https://complutig.com/en/home/	Cartography and remote sensing	Cartography and remote sensing	Ignacio Bravo	Yes	small
Eco al Cuadrado S.L	https://ecocuadrado.com/en/	Biology	Recycling, reusing	Ignacio Bravo	Yes	small
FABRICADOS ELECTROMECANICOS ESTEVEZ	https://www.fabrezgroup.com/home/	Chemistry	Environment	Ignacio Bravo	Yes	small
FUNDACIÓN DE INVESTIGACIÓN HM HOSPITALES Y ATRYS HEALTH S.A.	https://www.internationalhm.com/en	Medicine	Health	Ignacio Bravo	Yes	small
Ingeniería Viesca S.L.	https://www.ingenieriaviesca.com/?lang=en	Power Electronics	Power Electronics	Ignacio Bravo	Yes	small
GRUPO JUSTE	https://www.grupojuste.com/en/	Chemistry	Pharma	Ignacio Bravo	Yes	small
MARSI BIONICS	https://www.marsibionics.com/en/	Industrial Engineering	technology for gait training	Ignacio Bravo	Yes	small
METFILTER	http://metfilter.com/	Chemistry	Water Recycling	Ignacio Bravo	Yes	small
NANOELECTRA	https://nanoelectra.com/	Chemistry	Microbial Electrochemical Technologies	Ignacio Bravo	Yes	small
PROYECTOS DE ECONOMÍA CIRCULAR S.L.	https://precocircular.com/en/	Chemistry	Plastic recycling	Ignacio Bravo	Yes	small
IBOX CREATE	https://iboxcreate.es/en/	Unknown	Consulting	Ignacio Bravo	Unknown	small
NOVARTIS SPAIN	https://www.novartis.com/es-es/	Chemistry	Pharma	Ignacio Bravo	Yes	Large
Supply Nexus	https://supplynexus.com/	IT	Supply Chain	Ignacio Bravo	Unknown	SMALL
GMV	https://gmv.com/en-es	ICT	ICT	Ignacio Bravo	Yes	Large
DAS PHOTONICS	https://www.dasphotonics.com/	Photonics	Defense	Ignacio Bravo	Yes	Small
Airbus Defence	https://www.airbus.com/en/products-services/defence	Tele communications	Defense	Ignacio Bravo	Yes	Large
IENAI SPACE	https://ienai.space/	Tele communications	Aerospace	Ignacio Bravo	Yes	Medium
ATOS SPAIN	https://atos.net/es/spain	ICT	Consulting	Ignacio Bravo	Yes	Large

ADVANTICSYS	https://www.advanticsys.com/	ICT	ICT	Ignacio Bravo	Yes	small
ASTANDER	https://www.astander.es/	Engineering	Naval Sector	Ignacio Bravo	Not mandatory	medium

List of employers as defined by UCA

Company	Website	Doctoral area	Company sector of activity	Key contact from the DocTalent4EU project	Does company has R&D preoccupation?	Company size
Arion : Laboratoires Arion	https://laboratoires-arion.fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	
AXONIC	https://www.axonic.fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Small
BAYER SAS	https://www.bayer.fr/fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
BIOPRESERV	https://biopreserv.fr/fr/	Life sciences	Professional Services	Auréa Cophignon	Yes	Small
BIOVOTEC FRANCE	https://www.biovotec.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Medium
BOIRON LABORATOIRES	https://www.boiron.fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
Clarteis	http://www.clarteis.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
E-PHY-SCIENCE	https://www.e-phy-science.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Small
EXSYMOL	https://www.exsymol.com/fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Medium
IBSA Pharma	https://www.ibsa-pharma.fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
GENOCHEM	https://geno-chem.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
IMMUNOSEARCH	http://www.immunosearch.fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Small
Mane	https://www.mane.com/	Life sciences	Manufactu-ring	Auréa Cophignon	Yes	Big
NICOX SA	https://www.nicox.com/fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Medium
NOVETECH SURGERY	https://www.novetech-surgery.com/	Life sciences	Agriculture & Animal Care	Auréa Cophignon	Yes	Small
NUVISAN France	https://www.nuvisan.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
PHENOCELL	https://fr.phenocell.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Small
SANGAMO THERAPEUTICS FRANCE	https://www.sangamo.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
SOLIDAGES	https://www.protibis.com/index.php/fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	
SYNEOS HEALTH France	https://ca.syneoshealth.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
Arkopharma	https://www.arkopharma.com/fr-FR	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
Horus Pharma	https://www.horus-pharma.com/fr/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big
Ineldea	https://www.ineldea.com/en/	Life sciences	Healthcare	Auréa Cophignon	Yes	Big

Innoskel	https://www.innoskel.com/	Life sciences	Healthcare	Auréa Cophignon	Yes	Medium
INALVE	https://inalve.com/	Life sciences	Agriculture & Animal Care	Auréa Cophignon	Yes	Medium
MYCOPHYTO	http://mycophyto.fr/	Life sciences	Agriculture & Animal Care	Auréa Cophignon	Yes	Medium
VIRBAC	https://fr.virbac.com/	Life sciences	Agriculture & Animal Care	Auréa Cophignon	Yes	Big
Sofiacosmétiques	https://www.sofiacosmetiques.fr/	Life sciences	Science & Engineering	Auréa Cophignon	Yes	Medium

List of employers as defined by UiT

Company	Website	Doctoral area	Company sector of activity	Key contact from the DocTalent4EU project	Does company has R&D preoccupation?	Company size
Framsenteret	https://framsenteret.no/	Scientific research	Research center	Helene N. Andreassen	Yes	Small
NOFIMA	https://nofima.no/	Scientific research	Research center	Ronan Gombau	Yes	Medium
Biotec Beta Glucans AS	https://m-gard.com/	Chemistery; health	Health	Ronan Gombau	Yes	Small
Institute of Marine Research IMR	https://www.hi.no/en	Scientific research	Research center	Ronan Gombau	yes	Medium
DIPS AS	https://www.dips.com/	Health; system development	IT; health	Ronan Gombau	-	Small
Troms og Finnmark fylkeskommune	https://www.tffk.no/	-	Public institution	Ronan Gombau	-	Big
Norce	https://www.norceresearch.no/en/	Scientific research	Research center	Ronan Gombau	Yes	Medium
Akvaplan Niva	https://www.akvaplan.niva.no/en/home/	Scientific research	Research center	Ronan Gombau	Yes	Medium
Innovation Norway	https://www.innovasjonnorge.no/en/start-page/	-	Public institution	Ronan Gombau	No	Medium
GE Healthcare	https://www.gehealthcare.no/	Health	Health	Ronan Gombau	Yes	Big
Norwegian Polar Institute	https://www.npolar.no/	Scientific research	Research center	Ronan Gombau	Yes	Medium
Nina	https://www.nina.no/	Scientific research	Research center	Ronan Gombau	Yes	Medium
Smartsoil AS	https://www.digitallifenorway.org/research/smartsoil/	Agriculture	Agriculture	Ronan Gombau	-	Small

Elixir Norway	https://elixir.no/	Health	Health	Ronan Gombau	-	Small
Sauda kommune	https://www.sauda.kommune.no/	-	Public institution	Ronan Gombau	No	Medium
Norwegian Seafood Council	https://en.seafood.no/	Marketing; Fisheries	Public institution	Ronan Gombau	No	Medium
GreenCap Solutions AS	https://greencap-solutions.com/	Chemistery	CO2 capture	Ronan Gombau	Yes	Small
Fiskeridirektoratet	https://www.fiskeridir.no/	Law; Fisheries	Fisheries management	Ronan Gombau	No	Big
NIVA	https://www.niva.no/	Scientific research	Scientific research	Ronan Gombau		Big
Equinor	https://www.equinor.com/	Chemistry	Oil and gas	Ronan Gombau	Yes	Big
Andøya Space	https://www.andoyaspace.no/	Physics	Spatial	Ronan Gombau	-	Medium
KSAT	https://www.ksat.no/	Physics; engineering	Spatial	Ronan Gombau	-	Big
Troms Kraft	https://www.tromskraft.no/	Physics	Energy	Ronan Gombau	-	Big
SINTEF	https://www.sintef.no/	Scientific research	Research center	Ronan Gombau	Yes	Big
Stella Polaris	https://www.stellapolaris.no/	Biology; chemistry	Seafood production	Ronan Gombau	-	Small
Nordlandssykehuset	https://nordlandssykehuset.no/	Health	Health	Ronan Gombau	-	Medium

List of employers as defined by ULim

Company Name	Website	Company sector of activity	Key contact from the DocTalent4EU project	Does company has R&D preoccupation?	Company size
AMCS	https://www.amcsgroup.com/	AMCS: Waste and recycling management software solutions	Gerard Downes	Yes	Small to Medium
Abbott Galway	https://www.ie.abbott/	Abbott Galway: Medical devices and diagnostics	Gerard Downes	Yes	Medium
Advent	https://www.adventinternational.com/	Advent: Private equity and venture capital	Gerard Downes	Yes	Small to Medium

Aercap	https://www.aercap.com/	Aercap: Aircraft leasing and aviation services	Gerard Downes	Yes	Large
Aerogen	https://www.aerogen.com/	Aerogen: Medical device manufacturing, specializing in aerosol drug delivery	Gerard Downes	Yes	Small to Medium
Alere	https://www.globalpointofcare.abbott/us/en/index.html	Alere: Medical diagnostics and health management solutions	Gerard Downes	Yes	Small to Medium
Alpha precision ltd	https://alphaprecision.ie/	Alpha Precision Ltd: Precision engineering and manufacturing	Gerard Downes	Yes	Small
ALS Minerals	ALS Minerals: https://www.alsglobal.com/	ALS Minerals: Analytical laboratory services for the mining and minerals industry	Gerard Downes	Yes	Small to Medium
Analog Devices	Analog Devices: https://www.analog.com/	Analog Devices: Semiconductor and integrated circuit technology	Gerard Downes	Yes	Large
APW Galway	https://www.apwireless.ie/	APW Galway: Manufacturing and engineering solutions for the electronics industry	Gerard Downes	Yes	Small to Medium
Arup	Arup https //www.arup.com/	Arup: Engineering, design, and consulting services	Gerard Downes	Yes	Large
Atlantic Projects Company	https://www.atlanticprojects.com/	Atlantic Projects Company: Marine and offshore engineering and construction	Gerard Downes	No	Small
Attachmate WRQ	https://www.microfocus.com/en-us/products/attachmate/overview	Attachmate WRQ: Software solutions for secure terminal emulation and file transfer	Gerard Downes	Yes	Small to Medium
Aughinish Alumina	https://bauxite.world-aluminium.org/refining/case-studies/aughinish/	Aughinish Alumina: Aluminum production and refining	Gerard Downes	Yes	Large
Avara Pharmaceuticals Shannon	https://www.avara.com/	Avara Pharmaceuticals Shannon: Pharmaceutical manufacturing and development	Gerard Downes	Yes	Small to Medium
Baker Hughes	Baker Hughes https //www.bakerhughes.com/	Baker Hughes: Oilfield services and equipment	Gerard Downes	Yes	Medium to Large

Ballina beverages	https://www.dnb.com/business-directory/company-profiles.ballina_beverages.f3019d8261c4030e75c70cec6c1db709.html	Ballina Beverages: Beverage production and bottling	Gerard Downes	Yes	Small to Medium
Bauche & Lombe	https://www.bausch.com/	Bauche & Lombe: Precision engineering and manufacturing	Gerard Downes	No	Small
Beckman Coulter	Beckman Coulter https //www.beckmancoulter.com/	Beckman Coulter: Biomedical testing and diagnostic solutions	Gerard Downes	Yes	Medium
Becton Dickinson	Becton Dickinson https //www.bd.com/	Becton Dickinson: Medical technology and healthcare solutions	Gerard Downes	Yes	Medium to Large
Biomedical Research	Website not active	Biomedical Research: Biotechnology research and development	Gerard Downes	No	Small
Bolgers engineering	https://www.bolgers.com/	Bolgers Engineering: Precision engineering and manufacturing	Gerard Downes	No	Small to Medium
Boston scientific	Boston Scientific https //www.bostonscientific.com/	Boston Scientific: Medical devices and technologies	Gerard Downes	Yes	Large
Canyon CTS (now Vistra)	https://www.vistra.com/capital-markets/aircraft-leasing/canyon	Canyon CTS: Electronic manufacturing services	Gerard Downes	No	Small
Carragh Precision	https://caraghprecision.com/	Carragh Precision: Precision engineering and manufacturing	Gerard Downes	Yes	Small
Chanelle Group	Chanelle Group https //www.chanellegroup.ie/	Chanelle Group: Pharmaceutical manufacturing and distribution	Gerard Downes	Yes	Large
Colas teoranta	https://colas.ie/	Colas Teoranta: Construction and infrastructure services	Gerard Downes	Yes	Medium
Cook Ireland	Cook Ireland https //www.cookmedical.com/	Cook Ireland: Medical device manufacturing, specializing in minimally invasive procedures	Gerard Downes	Yes	Large
Creganna medical	https://www.te.com/usa-en/products/brands/creganna.html	Creganna Medical: Medical device design and manufacturing	Gerard Downes	No	Small to Medium

Croom Precision Medical	https://croommedical.com/	Croom Precision Medical: Precision engineering and manufacturing for the medical industry	Gerard Downes	Yes	Small
DB Schenker	DB Schenker https //www.dbschenker.com/	DB Schenker: Logistics and transportation services	Gerard Downes	Yes	Small to Medium
Deepak fasteners Sps International	https://www.deepakfasteners.com/	Deepak Fasteners SPS International: Fastener manufacturing and supply	Gerard Downes	No	Small
Dell	Dell https //www.dell.com/	Dell: Computer hardware, software, and IT services	Gerard Downes	Yes	Large
Design pro	https://designproautomation.com/	Design Pro: Automation and machine vision systems	Gerard Downes	Yes	Small
EI Electronics	EI Electronics https //www.eielectronics.com/	EI Electronics: Fire and carbon monoxide detection systems	Gerard Downes	No	Medium
Electronic concepts	https://www.ecicaps.com/us/	Electronic Concepts: Electronic component manufacturing	Gerard Downes	No	Small
Element Six	Element Six https //www.e6.com/	Element Six: Synthetic diamond and supermaterials	Gerard Downes	Yes	Medium
GE Commercial Aviation Services	https://www.ge.com/	GE Commercial Aviation Services: Aircraft leasing and financing	Gerard Downes	Yes	Medium
GMT Ireland Ltd	https://www.constructionireland.ie/c/571440/gmt-ireland-ltd	GMT Ireland Ltd: Precision engineering and manufacturing	Gerard Downes	No	Small
Golden Vale	https://gvmgroup.ie/	Golden Vale: Dairy and food products	Gerard Downes	No	Medium
Hamilton Sundstrand	https://www.collinsaerospace.com/	Hamilton Sundstrand: Aerospace and industrial systems	Gerard Downes	Yes	Medium
Heraeus Metal Processing	https://www.heraeus-group.com/en/?location=3173	Heraeus Metal Processing: Metal refining and processing	Gerard Downes	Yes	Small to Medium
Hewlett-Packard (Galway)	https://www.hpe.com/ie/en/home.html	Hewlett-Packard (Galway): Information technology and services	Gerard Downes	Yes	Large
Heyco	https://www.vision-net.ie/Company-Info/Heyco-Werk-Ireland-Limited-39938	Heyco: Electrical and electronic components	Gerard Downes	No	Small

Highlife tools	https://www.ptgtools.com/	Highlife Tools: Precision engineering and manufacturing	Gerard Downes	No	Small
Huber group	https://www.hubergroup.com/ie/en/	Huber Group: Printing inks and coatings	Gerard Downes	No	Small
Integer	Integer https //www.integer.net/	Integer: Medical device outsourcing and manufacturing	Gerard Downes	Yes	Small to Medium
ITW filtertek	http://itwmedical.com/	ITW Filtertek: Filtration solutions for various industries	Gerard Downes	Yes	Small to Medium
J&J Vision	J&J Vision https //www.jjvision.com/	J&J Vision: Ophthalmic medical devices and vision care products	Gerard Downes	Yes	Large
Jaguar landrover	Jaguar Land Rover https //www.jaguarlandrover.com/	Jaguar Land Rover: Automotive manufacturing	Gerard Downes	Yes	Large
James McMahon Group	https://www.mcmahons.ie/	James McMahon Group: Construction and civil engineering	Gerard Downes	No	Small
John Crane ltd	John Crane Ltd https //www.johncrane.com/	John Crane Ltd: Mechanical seals and sealing systems	Gerard Downes	Yes	Small to Medium
Kirby Group Engineering	Kirby Group Engineering https //www.kirbygroup.com/	Kirby Group Engineering: Electrical and mechanical engineering services	Gerard Downes	Yes	Small
Kostal Ireland	https://www.kostal.com/en-gb/	Kostal Ireland: Automotive electronics and electrical systems	Gerard Downes	Yes	Medium
Lilly	Lilly https //www.lilly.com/	Lilly: Pharmaceutical research, development, and manufacturing	Gerard Downes	Yes	Large
Lisk Ireland limited	https://www.gwlisk.com/	Lisk Ireland Limited: Solenoid valves and control systems	Gerard Downes	Yes	Small
Logstrup (Ireland) Ltd.	https://www.logstrup.com/contact/logstrup-ireland/	Logstrup (Ireland) Ltd: Electrical switchgear and control systems	Gerard Downes	No	Small
Lufthansa Technik Turbine	https://www.ltts.ie/	Lufthansa Technik Turbine: Aircraft engine maintenance and repair	Gerard Downes	Yes	Large
Materion	Materion https //materion.com/	Materion: Advanced materials and services	Gerard Downes	Yes	Medium to Large

Medtronic	_Medtronic_https //www.medtronic.com/	Medtronic: Medical technology and therapies	Gerard Downes	Yes	Medium
Merit Medical	_Merit Medical_https //www.merit.com/	Merit Medical: Medical devices for interventional and diagnostic procedures	Gerard Downes	Yes	Medium
Microsemi	https://www.microsemi.com/	Microsemi: Semiconductor solutions for aerospace, defense, and industrial markets	Gerard Downes	Yes	Medium
Modular Automation	_Modular Automation_https //www.modularautomation.ie/	Modular Automation: Automation and robotics systems integration	Gerard Downes	No	Small
Molex	_Molex_https //www.molex.com/	Molex: Electronic connectors and interconnect solutions	Gerard Downes	Yes	Large
MSA Safety	_MSA Safety_https //us.msasafety.com/	MSA Safety: Safety products and equipment	Gerard Downes	Yes	Medium
Nelipak	_Nelipak_https //www.nelipak.com/	Nelipak: Custom thermoformed packaging solutions for the medical industry	Gerard Downes	No	Small
Nortel Networks (Ireland)	https://www.vision-net.ie/Company-Info/Nortel-Networks-Ireland-Limited-40287	Nortel Networks (Ireland): Telecommunications equipment and solutions	Gerard Downes	No	Large
Northern Trust	_Northern Trust_https //www.northerntrust.com/	Northern Trust: Financial services and asset management	Gerard Downes	Yes	Medium
OMC Engineering Limited	https://omctechnologies.com/	OMC Engineering Limited: Precision engineering and manufacturing	Gerard Downes	No	Small
Omega Aviation	http://www.omegaaviationservices.com/	Omega Aviation: Aircraft maintenance and support services	Gerard Downes	Yes	Small
Onsemiconductors	https://www.onsemi.com/company/about-onsemi/locations/limerick-ireland	Onsemiconductors: Semiconductor solutions for power management and sensors	Gerard Downes	No	Small to Medium

Organic Lens Manufacturing	https://www.vision-net.ie/Company-Info/Organic-Lens-Manufacturing-Olm-Limited-689771	Organic Lens Manufacturing: Contact lenses and optical products	Gerard Downes	Yes	Small
Pallas Foods	_Pallas Foods_https //www.pallasfoods.com/	Pallas Foods: Foodservice distribution and supply	Gerard Downes	No	Small
panametrics	https://www.bakerhughes.com/panametrics	Panametrics: Ultrasonic testing and measurement instruments	Gerard Downes	Yes	Small
Penn engineering	_Penn Engineering_https //www.pemnet.com/	Penn Engineering: Fastening and joining solutions	Gerard Downes	Yes	Small to Medium
Pepper finance	https://www.pepper-advantage.ie/	Pepper Finance: Financial services and lending	Gerard Downes	No	Small
Project Delivery Partners	https://www.projectdeliverypartners.com/	Project Delivery Partners: Project management and consulting services	Gerard Downes	No	Small to Medium
Reagecon Diagnostics Limited	https://www.reagecon.com/en-gb/	Reagecon Diagnostics Limited: Chemical and laboratory reagents	Gerard Downes	Yes	Small
Regeneron Pharmaceuticals, Inc	_Regeneron Pharmaceuticals, Inc_https //www.regeneron.com/	Regeneron Pharmaceuticals, Inc: Biopharmaceutical research and development	Gerard Downes	Yes	Medium to Large
Rettig Ireland Limited	https://ie.kompass.com/c/rettig-ireland-limited/ie12596b/	Rettig Ireland Limited: Heating and cooling solutions	Gerard Downes	No	Small
Rusal Aughinish Alumina	https://bauxite.world-aluminium.org/refining/case-studies/aughinish/	Rusal Aughinish Alumina: Aluminum production and refining	Gerard Downes	No	Small
Selio Medical	https://seliomedical.com/	Selio Medical: Medical device manufacturing, specializing in minimally invasive surgery	Gerard Downes	No	Small
Shannon Aerospace	https://www.atlanticaviation.ie/	Shannon Aerospace: Aircraft maintenance, repair, and overhaul	Gerard Downes	Yes	Small to Medium
Shannon Coiled Springs	https://www.scspring.ie/	Shannon Coiled Springs: Precision spring manufacturing	Gerard Downes	Yes	Small

Shannon Engine Support	https://www.ses.ie/	Shannon Engine Support: Engine maintenance and support services	Gerard Downes	Yes	Small
Shannon technical services	https://shannontechnicalservices.com/	Shannon Technical Services: Technical and engineering services	Gerard Downes	No	Small
Smart Electronics Ltd	https://smartelectronics.ie/	Smart Electronics Ltd: Electronic manufacturing services	Gerard Downes	Yes	Small
Smithstown Light engineering	https://sle.ie/	Smithstown Light Engineering: Precision engineering and manufacturing	Gerard Downes	Yes	Small
Steris	Steris https //www.steris.com/	Steris: Infection prevention and sterilization solutions	Gerard Downes	Yes	Small to Medium
Stryker Orthopaedic	Stryker Orthopaedic https //www.stryker.com/	Stryker Orthopaedic: Medical devices and technologies for orthopedic surgery	Gerard Downes	Yes	Large
Takumi precision engineering	https://takumiprecision.com/	Takumi Precision Engineering: Precision engineering and manufacturing	Gerard Downes	No	Small
TE Connectivity	TE Connectivity https //www.te.com/	TE Connectivity: Connectivity and sensor solutions	Gerard Downes	Yes	Medium to Large
Teckro	Teckro https //www.teckro.com/	Teckro: Clinical trial software and data analytics	Gerard Downes	Yes	Medium
Teleflex Medical	Teleflex Medical https //www.teleflex.com/	Teleflex Medical: Medical devices and surgical instruments	Gerard Downes	Yes	Medium
Thermo King Ireland	https://europe.thermoking.com/	Thermo King Ireland: Transport refrigeration and temperature control systems	Gerard Downes	No	Medium
Transact Campus Ireland	https://transactcampus.com/	Transact Campus Ireland: Payment and credential solutions for higher education	Gerard Downes	Yes	Medium
Transitions Optical Ltd:	https://www.transitions.com/en-ie/	Transitions Optical Ltd: Photochromic lenses and eyewear	Gerard Downes	Yes	Small to Medium
Valeo Vision	https://www.valeo.com/en/ireland/	Valeo Vision: Automotive lighting and vision systems	Gerard Downes	No	Small

Volga Dnepr Airlines (Ireland)	https://ar2015.volga-dnepr.com/en/company/about	Volga Dnepr Airlines (Ireland): Air cargo transportation and logistics	Gerard Downes	No	Medium
Weener plastics	Weener Plastics https //www.wppg.com/	Weener Plastics: Plastic packaging solutions	Gerard Downes	No	Small
Wyeth Nutritionals Ireland	https://www.wyethnutrition.com/	Wyeth Nutritionals Ireland: Infant formula and nutritional products	Gerard Downes	Yes	Large
Zenith Technologies	https://www.zenithtechnologies.com/	Zenith: Engineering and technical services	Gerard Downes	Yes	Large

List of employers as defined by TUIASI

Company	Website	Doctoral area	Company sector of activity	Key contact from the DocTalent4 EU project	Does company has R&D preoccupation?	Company size
CONEST SA	http://conestiasi.ro/en/	Civil engineering	civil engineering, building services	Alina Adriana MINEA	No	medium-sized
RULMENTI S.A. Barlad, Romania	https://www.urbgroup.com/	Material engineering	manufacture of bearings, gears, gearboxes and mechanical transmission elements	Alina Adriana MINEA	Yes	big
Greenfiber International	https://www.green-fiber-global.com/en	Material engineering	manufacture of synthetic fibers	Alina Adriana MINEA	Yes	big
SST GRUP TERMO SRL		Civil engineering	installations	Alina Adriana MINEA	No	small
AUTO PADOVA SRL	https://www.autopadova.com/	Automotive engineering	sale of vehicles / maintenance and repair of road vehicles -	Alina Adriana MINEA	No	medium-sized
S.C. BIOCOMP S.R.L.	https://biocomp.ro/	Electrical engineering	production of disinfection devices with UV-C ultraviolet light technology	Alina Adriana MINEA	Yes	small
SC CODE711STUDI SRL		Architecture	architecture	Alina Adriana MINEA	No	small
ELECTROPUTERE VFU PASCANI S.A.	http://www.electroputerevfu.ro/home	Material engineering	manufacturing of rolling stock	Alina Adriana MINEA	Yes	big
Arcadis Excellence Center Romania	https://www.arcadis.com/	Engineering and management	engineering and consulting	Alina Adriana MINEA	Yes	big

ArcelorMittal Tubular Products Iasi	https://tubular.arcelormittal.com/certificates/iasi/language/EN	Mechanical engineering	production of steel tubes, pipes, tubular profiles and accessories for them	Alina Adriana MINEA	Yes	medium-sized
SC ELECTRA SRL	https://www.electra.ro/	Electronics and communications	manufacture of consumer electronic products	Alina Adriana MINEA	Yes	medium-sized
Orange Romania	https://www.orange.ro/	Electronics and communications	Telecom/IT	Alina Adriana MINEA	Yes	big
Vitesco Technologies	https://www.vitesco-technologies.com/en-us	Automotive engineering	automotive industry	Alina Adriana MINEA	Yes	big
OMCO Romania SRL	https://www.omcomould.com/	Material engineering	forming for materials development	Alina Adriana MINEA	Yes	big
Aerostar S.A. Bacău	https://www.aerostar.ro/index-en	Aerospace engineering	aerospace industry	Alina Adriana MINEA	Yes	big
Salubris S.A.	https://salubris.ro/	Material engineering	services - collection of non-hazardous waste	Alina Adriana MINEA	Yes	big
KATTY FASHION	https://katty-fashion.com/	Industrial engineering	manufacture of other articles of clothing (excluding underwear)	Alina Adriana MINEA	No	small
Blue Projects Industries	https://blueprojects.com/	Civil engineering	industrial and civil constructions	Alina Adriana MINEA	Yes	medium-sized
S.C. SEFAR S.R.L.	https://www.sefar.com/en/	Industrial engineering	industry - production - weaving	Alina Adriana MINEA	Yes	big
ANCOM- Autoritatea Nationala pentru Administrare si Reglementare in Comunicatii	https://www.ancom.ro/en/	Electronics and communications	communication	Alina Adriana MINEA	No	medium-sized
Trei Brutari S.R.L.	https://www.treibrutari.ro/articles-news	Material engineering	bakery and biscuits	Alina Adriana MINEA	No	medium-sized
BorgWarner Romania	https://www.borgwarner.com/home	Automotive engineering	automotive industry	Alina Adriana MINEA	Yes	big
Continental Lighting	https://www.continental.com/en/company/suppliers/ergonomics-requirements/lighting/	Engineering and management	research and development	Alina Adriana MINEA	Yes	big
SC GRUP CONSTRUCTII EST SA	http://www.grupconstructiiest.ro/index_en.html	Civil engineering	construction	Alina Adriana MINEA	Yes	medium-sized
DAS SRL	https://www.das.ro/	Civil engineering	constructions and building services	Alina Adriana MINEA	No	medium-sized
HeidelbergCement România	https://www.heidelbergcement.ro/ro	Civil engineering	building materials	Alina Adriana MINEA	Yes	big

AMD Advanced Micro Devices (Rou) SRL	https://www.amd.com/en	Computers and information technology / Systems engineering	software development	Alina Adriana MINEA	No	medium-sized
PROINVEST GROUP	https://www.proinvestgroup.ro/	Material engineering	production of steel components	Alina Adriana MINEA	Yes	big
S.C. STEF-INVEST S.R.L.	https://www.stefinvest.ro/	Civil engineering	civil, industrial and agricultural constructions	Alina Adriana MINEA	No	medium-sized
Graphein Topo Iasi	https://graphein.ro/en/	Geodesy engineering	topography	Alina Adriana MINEA	No	small
Continental Automotive Romania SRL	https://www.continental.com/en/	Automotive engineering	IT/Automotive	Alina Adriana MINEA	Yes	big
Grup Electroalfa	https://electroalfa.ro/	Industrial engineering	production	Alina Adriana MINEA	No	big
Amazon		Computers and information technology / Systems engineering	software development	Alina Adriana MINEA	Yes	big

List of employers as defined by UPORTO

Company	Website	Doctoral area	Company sector of activity	Key contact from the DocTalent 4EU project	Does company has R&D preoccupation?	Company size
Advanced Cyclone Systems	www.advancedcyclonesystems.com	Chemical Engineering	Cyclone Systems	Marta Rodrigues	Yes	small
Águas de Douro e Paiva	www.addp.pt/home.php	Environmental Engineering; Civil Engineering; Environmental Engineering; Industrial and Management Engineering	Water Treatment	Marta Rodrigues	Yes	medium
Armis Group	www.armis.pt	Telecommunications, Informatics and Computing	IT	Marta Rodrigues	Yes	medium
BA Glass	www.baglass.com/en	Industrial and Management Engineering	Glass Industry	Marta Rodrigues	Yes	big
Bondalti	www.bondalti.com	Chemical Engineering	Industrial Chemicals and	Marta Rodrigues	Yes	big

			nanomaterials			
Continental Mabor	www.continentalmabor.pt	Chemical Engineering; Electrical and Computers Engineering; Informatics and Computing Engineering	Tyres Industry	Marta Rodrigues	Yes	big
Durit	www.durit.com/pt	Metallurgy and Materials Engineering	Producer of hard metal components	Marta Rodrigues	Yes	medium
Efacec	www.efacec.pt	Industrial and Management Engineering; Informatics and Computing; Electrical and Computers Engineering	Energy, Mobility, Systems	Marta Rodrigues	Yes	big
GSFAN Indústria	http://gsfan.pt/	Metallurgy and Materials Engineering	Additive Manufacturing	Marta Rodrigues	Yes	small
Jerónimo Martins	www.jeronimomartins.com/pt	Industrial and Management Engineering	Food distribution and Retail	Marta Rodrigues	Unknown	big
Kaizen Institute	https://pt.kaizen.com/	Industrial and Management Engineering	Process Improvement, Quality	Marta Rodrigues	Yes	medium
Metro do Porto	www.metrodoporto.pt	Civil Engineering	Public Transportation	Marta Rodrigues	Yes	big
Mota Engil	www.mota-engil.com	Civil Engineering	Construction	Marta Rodrigues	Unknown	big
Natixis	https://natixispurplescan.com/	Informatics and Computing	Financial Services	Marta Rodrigues	Yes	big
Rangel Logistics Solutions	www.rangel.com/pt	Industrial and Management Engineering; Informatics and Computing	Logistics	Marta Rodrigues	Yes	big
REN	www.ren.pt	Chemical Engineering, Electrical and Computers Engineering	Electricity and Natural Gas	Marta Rodrigues	Yes	big
Tridonic	www.tridonic.com/com/en/	Electrical and Computers Engineering, Informatics and Computing	Supplier of lighting technology	Marta Rodrigues	Unknown	small

Vestas	www.vestas.com/en	Electrical and Computers Engineering	sustainable energy solutions - Wind Energy	Marta Rodrigues	Unknown	big
Vodafone	www.vodafone.pt	Telecommunications, Informatics and Computing	Telecommunications	Marta Rodrigues	Unknown	big

List of employers as defined by HVL

Company	Website	Doctoral area	Company sector of activity	Key contact from the DocTalent4 EU project	Does company has R&D preoccupation?	Company size
Framo	https://www.framo.com/	Computer Science; nautical operations.	Cargo pumping system, Fire water pumps, Sea water lift pumps, Water injection pumps, Pumps for underground storage, Marine Service, Oil & Gas Service, Oil Recovery Systems, Pumps for OSV vessels	Elisabet Veland		1200
Tryg Forsikring	https://www.tryg.no/	Computer Science	Insurance	Janina Juranek	No	1700
DNB	https://www.dnb.no/	Computer Science; Responsible Innovation and Regional Development	financial services group	Elisabet Veland		10000
Bergen Kommune	https://www.bergen.kommune.no/english	Computer Science; Responsible Innovation and Regional Development; Health, Function and Participation; Studies of Bildung and Pedagogical Practices.	municipality	Elisabet Veland		20000

Statens vegvesen	https://www.vegvesen.no/	PhD Programme in Computer Science	Road traffic management and planning	Guillaume Lapeyre	Yes	6700
Eviny	https://www.eviny.no/	Computer Science; Responsible Innovation and Regional Development	Energy production and distribution	Guillaume Lapeyre	yes	1500
Technic FMC	https://www.technipfmc.com/	Computer Science; Responsible Innovation and Regional Development	Subsea, Surface, New Energy Ventures, Fleet, Technology and Innovation, Digital transformation	Elisabet Veland		20000
HKDir - Norwegian Directorate for Higher Education and Skills	https://hkdir.no/	Bildund and Pedagogical Practices	governmental	Janina Juranek	No	
Digdir - Norwegian Digitalisation Agency	https://www.digdir.no/	Computer Science; Responsible Innovation and Regional Development	Norwegian government's foremost tool for faster and more coordinated digitalisation of the Norwegian public sector.	Janina Juranek	Yes	
HVL AFII	https://www.hvl.no/om/organisering/administrasjon/avdeling-for-forskning-internasjonalisering-og-innovasjon/	All PhD programmes	Research administration	Guillaume Lapeyre	No	20
Bergen Næringsråd	https://www.bergen-chamber.no/en/		build relations between businesses, government, local administration and research institutes.	Elisabet Veland		16
Sparebanken Sogn og Fjordane	https://www.ssf.no/	Computer Science; Responsible Innovation and Regional Development	Banking	Janina Juranek		310
Rogaland Fylkeskommune	https://www.rogfk.no/		Regional politics, Regional planning, Environmental tasks and resource management, Culture, Transport, Education, Dental health	Elisabet Veland		4000

Helse Førde	https://helse-forde.no/	Responsible Innovation and Regional Development; Health	Health sector	Elisabet Veland		3000
Skyss	https://www.skyss.no/	Computer Science; Responsible Innovation and Regional Development	Public transport and planning	Guillaume Lapeyre	yes	100?
Sweco	https://www.sweco.no/	PhD programme in Responsible Innovation and Regional Development. PhD Programme in Nautical Operations	Building, architecture and engineering consultancy	Janina Juranek		1800
AVO Consulting	https://avoconsulting.no/	Computer Science; Responsible Innovation and Regional Development	Management Consulting, Artificial Intelligence, Conversational AI, Robotic Process Automation, RPA, Digital Transformation, Machine Learning, AI, Chatbots, Virtual Assistants, Power BI, Process Improvement, Client Development, ML	Elisabet Veland		51-200
GCE Ocean Technology	https://www.gceocean.no/	Computer Science; Responsible Innovation and Regional Development	maritime technology, offshore, energy	Guillaume Lapeyre	yes	network organsitio n
Media City Bergen	https://mediacitybergen.no/	Computer Science; Responsible Innovation and Regional Development; Bildund and Pedagogical Practices	media technology, AI, telecommunicati ons, entrepreneurshi p, journalism	Guillaume Lapeyre	yes	network organsitio n
DNV	https://www.dnv.com/	Computer Science; Responsible Innovation and Regional Development; Health, Function and Participation.	Independent expert in assurance and risk management	Elisabet Veland		

Sammen	https://www.sammen.no/en/bergen	Responsible Innovation and Regional Development; Health, Function and Participation; Bildund and Pedagogical Practices	Housing, Career counceling, cafeterias, kindergarten, sports	Janina Juranek	No	530
StormGeo	https://www.stormgeo.com/	Computer Science	Weather intelligence services, market analysis, services for shipping industry	Bjarte Håvik	Yes	550
Helse Bergen	https://helse-bergen.no/	Computer Science; Health, Function and Participation.	Health sector	Bjarte Håvik	Yes	13000
Vestland fylkeskommune - Vestland County Council	https://www.vestlandfylke.no/	Computer Science; Responsible Innovation and Regional Development; Health, Function and Participation; Bildund and Pedagogical Practices	regional planning , upper secondary education, economic development and innovation, culture, arts and sports, dental care, roads and public transport, public health, integration	Bjarte Håvik	No	6000
Kongsberg Maritime	https://www.kongsberg.com/	Computer Science; Nautical Operations	maritime sector	Bjarte Håvik		2000-5000
Bremnes Seashore	https://www.seashore.no/	Computer Science; Nautical Operations; Responsible Innovation and Regional Development	Fish farming	Bjarte Håvik	No	300
Helse Fonna	https://helse-fonna.no/	Computer Science; Health, Function and Participation.	Health sector	Guillaume Lapeyre	Yes	4000
Lerøy Seafood	https://www.leroyseafood.com/	Computer Science; Responsible Innovation and Regional Development.	Aquaculture and fishing	Guillaume Lapeyre	yes	4200
Bouvet	https://www.bouvet.no/	Computer Science; Responsible Innovation and Regional Development.	Industry, energy, transport, culture, health, digitalisation, consultancy	Guillaume Lapeyre	yes	2000

Annex 4: Survey template, agreed and applicable to each HEI

DocTalent4EU Industry Survey on Transversal ('Soft') Skills and competences for PhD Candidates

As part of the Horizon Europe-funded DocTalent4 EU project, the University..... is asking employers for vital feedback on what you consider to be the most desirable transversal skills and competence that PhD graduates should possess.

We will use this feedback when designing and implementing training programmes and local talent managements centres for our PhD candidates.

The Doc Talent4EU project (https://cordis.europa.eu/project/id/101095292) is intended to develop the skills of PhD researchers in this region in order to enhance the employability of doctoral graduates in the non-academic sector.

In this survey, we are using the European Skills, Competences, Qualifications and Occupations (ESCO) classification of transversal skills and competences created by the European Commission to improve the supply of information on skills demand in the labour market. Please see: http://data.europa.eu/esco/skill/T. This will assist employers, universities, training providers and individuals by giving them up to date and standardised information on the skills and competences of researchers.

Information gathered from the survey will help increase levels of talent in the region by ensuring that universities and other institutes of higher education orient courses towards needs of the non-academic sector, where the majority of PhD graduates begin their careers.

To ensure that we continually improve and build upon this commitment, we invite you to participate in this brief poll, to better understand your perspective, to shape and inform these educational offerings.

Participation is voluntary.

Data from this poll will be anonymised and results generated will be shared with partners within the DocTalent4EU Consortium for the purpose of enhancing the delivery of future learning pathways in doctoral research.

Please complete and return by April 30-th 2023.

THANK YOU

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1. Which SECTOR/OCCUPATIONAL GROUP does your organisation best align with?

- Science & Engineering
- IT/ICT

- Business & Finance
- Manufacturing
- Planning and organising (organisational skills)
- Healthcare (inc. Social and Care)
- Legal & Security
- Construction
- Agriculture & Animal Care
- Hospitality (inc. Accommodation and Food)
- Arts, Sports & Tourism
- Transport & Logistics
- Administrative & Secretarial Services
- Sales, Marketing & Customer Service
- Creative industries / Arts
- Operative & Elementary
- Professional Services
- Wholesale & Retail
- Other industry

2. If you selected other industry in Q1 above please specify

_____

3. Organisation/Company Size (Number of Employees)

- 1,000 +
- Between 1,000 and 500
- Between 500 and 100
- Between 100 and 50
- Fewer than 50

4. Does your organisation engage in research & development activities which focus on innovation and the development of new products and/or services?

- Yes
- No
- Not sure

5.Is your organisation employing PhD graduates?

- Yes
- No
- Not sure

6. If the answer is “yes” to Question 5, can you insert the number of PhD graduates that are working in the company at this moment

- Less than 5
- 5 - 10
- 10-20
- More than 20
- Not sure

7.Would your organisation consider employing a PhD graduate in the future?

- Yes
- No
- Not sure

8. Does your organisation emphasise the importance of Transversal ('Soft') Skills and Competences as a form of upskilling for employees?

- Yes
- No
- Not sure

9. Within your organisation, what would you regard as the THREE most important transversal ('soft') skills and competences required for your employees now and in the near future? (Please tick three) The skills are defined as by ESCO (see http://data.europa.eu/esco/skill/T for details, if needed).

- T1.1 - mastering languages (language proficiency, talent for languages, language skills, multilinguals')
- T1.2 - working with numbers and measures (numeracy and mathematics, ability to understand and work with numbers, carrying out measurements)
- T1.3 - working with digital devices and applications (digital and technology-based competences, digital competencies, working with computers, computer literacy):
- T2.1 - processing information, ideas and concepts (processing qualitative information, processing quantitative information, analysing and interpreting information, processing of information):
- T2.2 - planning and organising (organisational skills, planning abilities, planning activities, planning skills, work planning):
- T2.3 - dealing with problems (problem solving skills, addressing problems and issues):
- T2.4 - thinking creatively and innovatively (creating new information, concepts, ideas, products, processes; carrying out activities in innovative and creative ways)
- T3.1 - working efficiently (efficiency, efficient working style, responding to the requirements of tasks and responsibilities, time-efficient work)
- T3.2 - taking a proactive approach (recognising opportunities, be proactive, identify opportunities, proactive personality, recognise opportunities)
- T3.3 - maintaining a positive attitude (demonstrating resilience, managing negative factors in life and work)

- T3.4 - demonstrating willingness to learn (demonstrating self-management and self-reflection)
- T4.1 – communicating (conversational skills, using language, symbols and text effectively; verbal skills, communication, communication skills, writing skills, argumentation skills)
- T4.2 - supporting others (providing support to others, support others, helpfulness)
- T4.3 - collaborating in teams and networks (working with others, acting with others to achieve aims)
- T4.4 - leading others
- T4.5 - following ethical code of conduct (scruples, values, value orientation, morals, handling of values, ethics, beliefs)
- T5.1 - manipulating and controlling objects and equipment (lifting, moving and placing objects, performing physical tasks and activities)
- T5.2 - responding to physical circumstances (demonstrating physical strength, demonstrating physical fitness, demonstrating endurance)
- T6.1 - applying health-related skills and competences
- T6.2 - applying environmental skills and competences
- T6.3 - applying civic skills and competences
- T6.4 - applying cultural skills and competences
- T6.5 - applying entrepreneurial and financial skills and competences
- T6.6 - applying general knowledge

10.Is your organisation prioritising the upskilling of employees at the moment?

- Yes, upskilling of employees is a key priority
- No, not a priority
- Unsure N/A

11. What do you consider to be the most important transversal skill and competence for employees within your organisation

_____

12. Looking ahead, would you be interested in scheduling an informal discussion about participating in a Focus Group with the University of ..... on the most important skills and competences for PhD researchers?

- Yes
- No
- Maybe

13.If you answered 'Yes' or 'Maybe' to Q.12, please provide a contact name within your organisation

_____

14.Name of Respondent's Organisation

By providing the name of your organisation we can be better informed of enterprise needs, locally, regionally and nationally

_____

15.Finally, if you would like to receive updates about the DocTalent4EU project, skills-related news and/or details about opportunities to deliver input into courses or upskilling of University of .....PhD candidates, please provide your e-mail address in the field below.

_____

Consent form for processing personal data by the HEI

The University..... (hereafter 'University') is committed to protecting your personal data and to respecting your privacy. The University collects and processes personal data in accordance with the Regulation (EU) 2018/1725 of the European Parliament.

We will keep your personal details provided in the present form as proof of your consent for a maximum of 2 years after the end of the project DocTalent4EU. You can freely withdraw your consent at any time by sending an e–mail to ..... The withdrawal will not affect the lawfulness of the processing carried out before you have withdrawn your consent. You can always consult the specific privacy statement for more information as regards the processing of your personal data and exercise your rights by using the contact details provided therein.

In this consent form you have the option to provide consent to either one or more personal data processing activities:

- I consent that my name and contact details are included in a contact list shared internally among the project DocTalent4EU.
- I consent to participating in interviews and news items which showcase activities linked to the project DocTalent4EU.

Comments:

1. All questions are REQUIRED, with the exception of 6, 13, 14 and 15.

2. The text highlighted in yellow needs to be adapted by each HEI, according to its needs and contact person.

3. Each HEI can introduce any extra question if it considers this appropriate.

Annex 5: Agenda for Breakfast Meetings

Breakfast Meetings (BM)

Date:
Place:
Organizing institution:
No. of participants:

Draft Agenda for Breakfast Meetings

1. **Introduction**
    a. DocTalent4EU introduction
    b. Objective/s of the Breakfast Meeting
    c. Introduction on transferable skills

2. **Interactive session**
    - How do you perceive exactly the competences as are defined by ESCO – focused discussion on most demanded competences
    - What is your opinion on the employability of doctoral candidates?
    - What is your opinion on HEIs initiatives as for example: Creating the Talent Management Centres, Focused Training on transferable skills (soft skills), ECTS recognition of transferable skills?
    - Discussion on courses proposal. Which are the first three choices?
    - Is there any other kind of recognition system that can offer you increased trust in your future employee?
    - Is it important that PhD graduates have supervision practices from academic and non-academic sectors?
    - What are your recommendations for PhD programmes to make researchers more "industry- and society- ready"?

3. **Conclusions**
    a. Synthesis of discussion.
    b. Sectoral conclusions and recommendation towards understanding skills needed for selected sector.
    c. Drawing up a final list of transferable skills identified for making researchers more '*industry- and society- ready*".

Annexes: List of Participants, Report from the BM

Annex 6: Interviews feedback collection template

- Invited guests list, by company and contact person.

Questions	Answers, by company			
	Company 1 name	Company 2	Company 3	Company 4
Invited person				
SECTOR/OCCUPATIONAL GROUP • Science & Engineering • IT/ICT • Business & Finance • Manufacturing • Planning and organising (organisational skills) • Healthcare (inc. Social and Care) • Legal & Security • Construction • Agriculture & Animal Care • Hospitality (inc. Accommodation and Food) • Arts, Sports & Tourism • Transport & Logistics • Administrative & Secretarial Services • Sales, Marketing & Customer Service • Creative industries / Arts • Operative & Elementary • Professional Services • Wholesale & Retail • Other industry				
Organisation/Company Size (Number of Employees) • 1,000 + • Between 1,000 and 500 • Between 500 and 100 • Between 100 and 50 • Fewer than 50				

Does your organisation engage in research & development activities which focus on innovation and the development of new products and/or services?				
Is your organisation employing PhD graduates?				
Would your organisation consider employing a PhD graduate in the future?				

- Table to be completed by the interview organizer. Minimum questions.

Questions	**Answers, by company**			
	Company 1	**Company 2**	**Company 3**	**Company 4**
How do you perceive exactly the competences as are defined by ESCO – focused discussion on most demanded competences				
What is your opinion on the employability of doctoral candidates?				
What is your opinion on HEIs initiatives as for example: Creating the Talent Management Centres, Focused Training on transferable skills (soft skills), ECTS recognition of transferable skills?				
Is there any other kind of recognition system that can offer you increased trust in your future employee?				
Discussion on courses proposal. Which are the first three choices?				

Is it important that PhD graduates have supervision practices from academic and non-academic sectors?				
What are your recommendations for PhD programmes to make researchers more "industry- and society-ready"?				

-Conclusions, suggestions