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pArtneRship foR AddressiNG mEgatrends in ICT - ARRANGE-ICT

Project No 2018-1-BG-01-KA203-048023

## **Output 4: Guide for Instructors:**

### **Prepare a Course for ARRANGEmyICTCareer Plan**

<b>Output Identification</b>	<b>04</b>
<b>Output Title</b>	Guide for Instructors
<b>Output Description (including elements of innovation, expected impact and transferability potential)</b>	<p>This intellectual output is the design and completion of a thorough guide for instructors. The guide will be developed based on the findings and feedback received by fine-tuning the Smart Job Hub and the exchange of good practices and experience among educational and industrial stakeholders. The guide will detail the resulted practices and will provide valuable instructions for the design and delivery of courses inspired by the identified megatrends, in an effort to alleviate the skills gap. This is an innovative tool that can be employed by any HEI (not just the ones participating in the consortium) that needs and intends to update its modules according to the latest major ICT industry trends. For that purpose, the output will be publicly available.</p>

**Abstract:** This contemporary research assignment presents a course planning model for ARRANGE-ICT E-learning platform in the fields of IT education. The goal is to create courses examples based on a local learning unique courses developed and conducted by local educators on site. Duration of the course range from approximately two to four days.

The main aim of the "pArtneRship foR AddressiNG mEgatrends in ICT" (ARRANGE-ICT) is to join together HEIs, entrepreneurship and industry in order to address the competences and occupational profile needs in the labour market, provide innovative solutions to skills mismatch and promote sustainable business opportunities. In this context, this project has the following key objectives:

- a) to bridge the current digital skills gap in southern Europe following the European Commission's 'e-Skills for jobs' campaign. ARRANGE-ICT will join representatives from governments, industry, academia and other key stakeholders across southern Europe through a Smart Job Hub
- b) to build an ecosystem of key partners for creating an access port in underrepresented talent pools
- c) to identify the underrepresented skills, the rationale behind the phenomenon of talented people who lack the traditional credentials to land a good job and the ICT domains with the most pressing needs
- d) to promote business opportunities, through a Smart Job Hub, between Universities and industry, including new ICT-based internship programs, common PhD student supervision between HEIs and industry and common Bachelor and Master theses supervision in SMEs, market and industry premises.
- e) to envisage a range of new initiatives to ensure that these skills are adequately promoted in the curriculum, in teacher development, in assessment practices and in learning content.

Southern Europe needs for skills training are changing rapidly. Strong foundation is intended to help support further research and strengthen policymaking.

The current situation with COVID-19 transforms (explodes) the on-site learning model to remote one. The new teaching material should support on the same or better way the development of the technical skills of ICT students. The model for skill gaps promotion changed rapidly last year. In this current research these changes are marked and explained in short. The model can be used for both planning and analyzing courses in the fields of digital literacy and computational thinking. The research seeks specific examples of teaching methods and specific cases from practice. The model provides simple advices for well-rounded didactic planning in e-learning in the fields of IT industry.

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The Project ARRANGE-ICT Executive Summary Overview and Challenges  
ARRANGE-IC - Reports and Focuses:

## Part 1: Study: Last Year Explosion in Area of Skills Demands and Classifications

Defining in short, the Current Classifications, Norms and Facts for Instructors

Defining Digital Jobs and Industries Classification Confusion

Hybrid jobs Shifting Roles Essential Skills

Digital Skills Frameworks Global Attempts

Emerging and Innovative Approaches to Closing the Skills Gap Inclusive Training, Recruitment  
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Training and Upskilling Programs

Next Steps

## Part 2: Guide for Instructors

“Smart Job Hub”- the Field for Project Findings and Online Tests

Prepare a Course for ARRANGEmyICTCareer Plan

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References (T024... T171) for “ARRANGEmyICTCareer”

Appendix A - Comparing Digital Skills Frameworks

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## The Project ARRANGE-ICT Executive Summary Overview and Challenges

The highly dynamic technological developments, the evolution of the socio-economic environment, the changes of the political conditions and other vastly influential factors greatly affect market trends, trigger growth, foster job opportunities and create new skill demands in a very fast pace. These powerful forces are identified as "megatrends". Even though centers of excellence, such as Small and Medium Enterprises (SMEs), research centers, market innovators and emerging industries, may benefit, through megatrends developments it is also evident that educational centers, especially Higher Education Institutes (HEIs), seem unable to cope with this fast transformation due to the rapid pace of changing and in some cases due to inflexible learning modes. This mismatch becomes even more intensive in ICTs, an area where megatrends raise urgent challenges and needs of high-qualified personnel. As a result, an inefficient loop is observed: centers of excellence struggle to find talented and skilled young specialists while graduated students are in lack of practical skills required in labor market and industry.

### ARRANGE-IC - Reports and Focuses:

Comparison of trends to understand the need of skills and competences Knowns and unknowns about skills in labor market information

Defining digital skills along with competences and the pathways to acquiring Rethinking the relationship between technology and the future of work

The need of investments of industry leadership in skills and training

### ARRANGE-IC – New Presentations:

ARRANGE-ICT project was successfully presented at the transnational cooperation activity “Fostering Erasmus+ cooperation projects impacts and cross fertilization on social inclusion and civic engagement” linked to the 20th Bologna Process Anniversary June 2019 and joined to the new “Digital Competences Manifesto” first presented at the [ALL DIGITAL General Assembly in May 2019](#), and after the extensive consultation with ALL DIGITAL members was adopted by the Board and then presented at the ALL DIGITAL Summit in Bologna on 11 October 2019. Digital competences are necessary in all aspects of life, whether they are social or personal, relate to labor or leisure, in any sector, public or private. Improved citizenship is the primary aim of developing digital competences. It is our conviction that the education and training on digital competences need a more consistent approach and a cohesive European system of delivery. That is why we have worked with our network of digital competence centers and relevant expert organizations on a Manifesto on digital competences.

The Manifesto contains a series of **key principles and recommendations** under **five main areas** on how to maximize the impact of education and training, as powerful instruments towards a continuous development of digital competences for the European citizens:

1. The education and training offer
2. Access to education and training
3. Quality of education and training



4. European homogeneous validation
5. Sustainability and development

The Manifesto is the result of a grassroots movement in Europe, but **we believe it speaks to everyone and everywhere**, and **ALL DIGITAL is ready to start a dialogue and engage in common actions** with partners around the world. This is one of the main tasks of our ARRANGE- ICT project to build an ecosystem of key partners for creating an access port in underrepresented talent pools. The ecosystem will function in a twofold way: first, it will enable graduated students to compete more effectively on the world stage and second it will leverage the access of industry and market to a pool of skilled and talented graduated students.

While ARRANGE-ICT reports multiple pathways to “digital careers,” accessing them requires innovations in skills development and in approaches to defining these roles. Yet a review of the most relevant digital skills frameworks shows there is little common understanding of the actual skills or knowledge that contribute to the skills gap; little common understanding of the dimensions of learning and training needed to improve it; muddled distinctions between areas of knowledge, competencies, skills and tools needed for 21st-century learning or work; and very little identification of skill levels.

#### Last Year New Classifications: Defining Norms and Facts for Instructors

The European e-Competence Framework (e-CF) standard EN 16234-1 is a main element of the ICT Professional Profiles description template. The framework provides a reference of currently 40 competences as required and applied at the ICT workplace, using a common reference language for competences, skills, knowledge, and capability levels that can be understood across Europe and internationally. The e-CF provides standardized language to describe occupations in the ICT labor market. But in this classification system, as in others, there is often confusion between a job, the skills and competencies needed to perform the job and the specific tools and techniques needed for the job. Moreover, the e-CF usefulness is also somewhat limited in the context of digital skills, as it has not kept pace with the emergence of technology based occupations, such as cloud engineer, nor has it developed a clear way of including hybrid roles.

Opening new pathways to digital skills, especially for those who are currently under-represented, will require the development of a better understanding around the deployment, monitoring and assessment of emerging approaches to digital skills identification, development, and employment.

Standard definitions and approaches need to be identified, established, and supported. We need better case studies to appreciate the effects of innovative approaches to developing and recruiting digital talent including inclusive training and recruitment practices; reconsidering credentials and assessment; and new forms of training and upskilling. Our approach to developing and applying digital skills will need to evolve, but for this evolution to be successful, we first need to understand what works, what is not working, and how to use inclusion to expand the talent pool.

#### Overview and Challenges

The project tries to bridge the current digital skills gap in southern Europe following the European Commission's 'e-Skills for jobs' campaign. ARRANGE-ICT will join representatives from governments, industry, Academia, and other key stakeholders across southern Europe through a Smart Job Hub. Universities, SMEs, industry and stakeholders

will work together using a common visual and digital job hub in order to enforce the digitalization of the European economy giving emphasis to the southern Europe, where the skill gap is much more intense compared to the northern Europe (e.g., high rates of unemployment and high number of ICT-related graduated students).

Digital skills are increasingly in demand. The shortage of skilled ICT talent in the technology sector is a major issue hampering the growth of innovative companies. Small and Medium Enterprises (SMEs) that need to adopt and use new technologies to innovate are especially impacted by these shortages. At the same time, however, points out that while the skills gap is significant for those firms facing skilled talent shortages, the shortage of ICT skills remains small and only a small share of enterprises are looking for ICT specialists.

While the origins and extent of the “digital skills gap” may be contested - something explored in detail below- this paper argues that the existence of this gap is real, provided a gap is understood as a lack of candidates with the skills required by particular employers. One consequence of this gap is that a number of efforts have been undertaken to remedy it, many of which have focused on “upskilling” as a potential solution. In brief, upskilling refers to the development of skills an employee will need to perform the same role in the future. But, while much research in this area has focused on increasing capacity in digital skills for graduates and mid-career employees alike, it is also important to recognize that the basic skills required by the workplaces of the future will not be solely technical in nature. For example, the World Economic Forum has projected that emotional intelligence, judgment and creativity will all figure in the top-10 skills needed to thrive in the workforce in 2020. Not losing sight of the importance of the liberal arts, arguing that alongside widespread demand for various digital and ICT capacities, the workplaces of the future will require foundational skills such as critical thinking, coordination, and social perceptiveness. In fact, HEI are increasingly offering programs designed to target and improve non-cognitive “soft-skill” capacities, with some leaders in business education even suggesting that these soft skills are harder to teach than technical ones. These perspectives support a drive towards upskilling and reskilling efforts rather than increased recruitment into traditional ICT-specific roles.

Some have questioned the existence of a digital skills gap entirely, pointing to a lag between the market demanding more candidates with digital skills and the market rewarding those candidates with the rising wages one would expect to see in a tight market for skilled ICT labor. In other words, economic indicators seem to reflect skills mismatches rather than acute shortages. For example, the under-employment of skilled immigrants is offered as evidence that the problem is recruitment and retention practices, not a shortage of skilled workers. Moreover, women and other groups are under-represented in ICT roles. Finally, it may be the case that the credentials employers require for many jobs rely on outdated assumptions about what those jobs involve rather than an analysis of the skills required to perform the role.

The evidence suggests there are multiple ways to acquire digital skills and multiple pathways into roles that require them. But opening these pathways further will require innovation in skills training and development. It will also require changes in how businesses, governments and individuals define those basic skills which they see as required, as well as in employer approaches to recruiting, training, and retaining workers.

But, while industry groups report acute skills challenges, the OECD community has stated that “the measurement of both the demand for and the supply of such skills falls short of the evidence base that is necessary to inform education and training policies.” Nonetheless, while this lack of available and timely data and labor market information represents a challenge in the design of education and training policies aimed at tackling the problems employers report,

governments, post-secondary institutions and community organizations have all launched projects to “bridge the skills gap” and build the digital talent pool.

Still, the Southern Europe lags its European peers. Southern Europe receives high scores in terms of the number of digitally skilled youth who are preparing to enter the workforce and in the widespread use of digital skills in the average person’s daily life. Concurrently, however, Southern Europe also receives only average scores around “leveraging innovation to stimulate skills use.” This inability to quickly integrate innovative technologies into the economy, and use the skills needed to apply them productively, suggests that Southern Europe’s comparative strength in digital skills is being under-applied. Other jurisdictions, including the rest of European Union, Australia and Singapore, have made much greater progress in developing the sorts of skills infrastructure, such as programs and taxonomies for digital skills-including digital skills toolkits, roadmaps and frameworks-that are needed.

This guide begins by considering the challenge of defining digital jobs and industries. It then reviews an international sample of digital skills frameworks (i.e., taxonomies and assessment tools) to understand approaches that differentiate between occupations, skills, tools and techniques. Next, it identifies emerging approaches to developing and recruiting digital talent, with a focus on local initiatives, including inclusive training and recruitment practices; reconsidering credentials and assessment; and training and upskilling. The paper concludes with a summary of insights and potential next steps.

### Defining Digital Jobs and Industries

The nature of digital skills and technology jobs can change quickly, challenging efforts to define and measure the digital labor market. Labor market projections depend on a range of factors and, while important for informing policy, are often inaccurate. This is particularly true in the ICT sector where the direction of technological change may be apparent, but its pace is unclear. Current trends in ICT include a shift towards digitization of government services, telecom growth, demand for platform and storage solutions, automation, and a blurring of sector boundaries. The pace of industry change is mainly defined by technology adoption, which is comparatively slow in Greece, Bulgaria, and Cyprus.

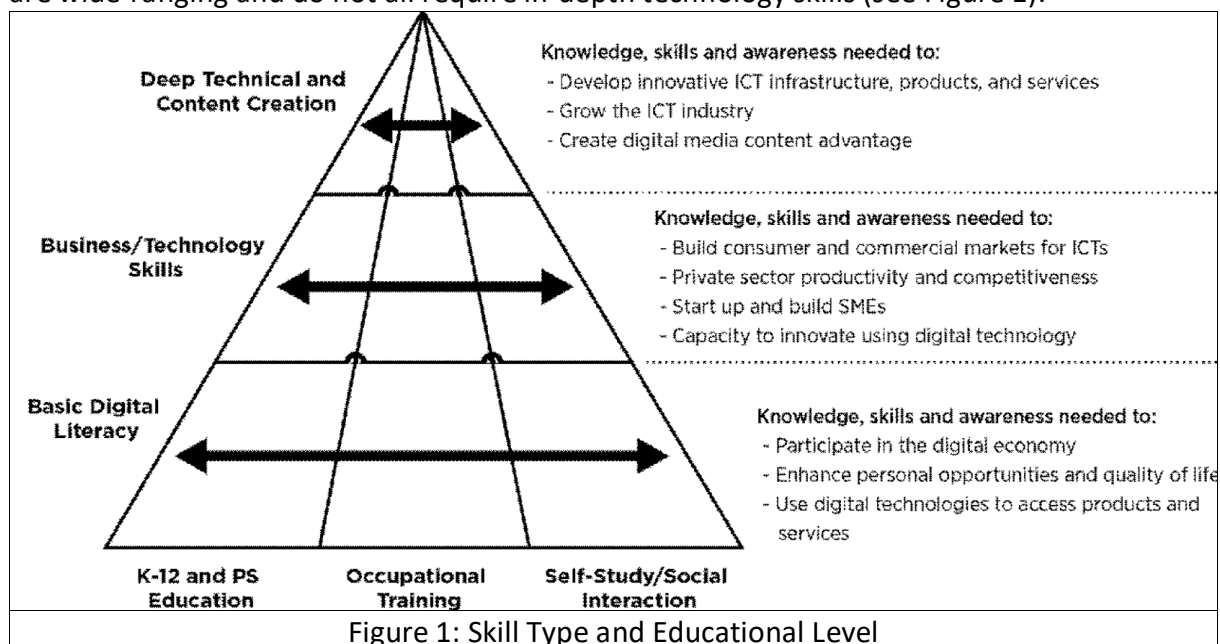
But, given the changing nature of work and the limitations of current occupational classifications, efforts at classification are focusing less on “jobs” and more on “skills” and “competencies.” Skills and competencies are abilities an individual acquires through training and experience. Skills are specific, learned activities that range in terms of complexity, while competencies have to do with behaviors that demonstrate the abilities needed to perform job requirements. Skills and competencies can be generic, crossing occupations and levels, or be very specific and tied to particular professions. The evidence suggests both are important for employee success. Current labor-market measurement approaches, however, are limited in their ability to accurately measure in-demand skills and competencies.

#### Classification Confusion

Digital skills shortages have been identified in sectors including financial services, manufacturing, health care and the public sector. In this guide, we define digital occupations as those that typically contribute to the development of computer hardware or software solutions (e.g. software developers or technology architects), whereas high-tech occupations are those that require advanced technical skills in which computers are used as a means to other ends (e.g., engineers or scientists).

The researchers’ estimate helps to illustrate how the vast majority of the need for digital skills

competencies is outside of the ICT sector. This is an important point because this fact has been a source of confusion for attempts at classification of digital jobs and occupations. Normally, the occupational classification system is used to define and classify occupations labor market. In this classification system, as in others, there is often confusion between occupations (the job), the basic skills and competencies needed to perform the job (e.g., computer programming, which typically takes years to develop), and the specific tools and techniques needed for the job (e.g., JavaScript or Python, which can be taught easily when someone has the foundational skills). Digital jobs vary considerably in terms of key competencies, skills and tools. While often seen as synonymous with engineering and computer science, digital jobs are wide-ranging and do not all require in-depth technology skills (see Figure 1).



## Hybrid Jobs

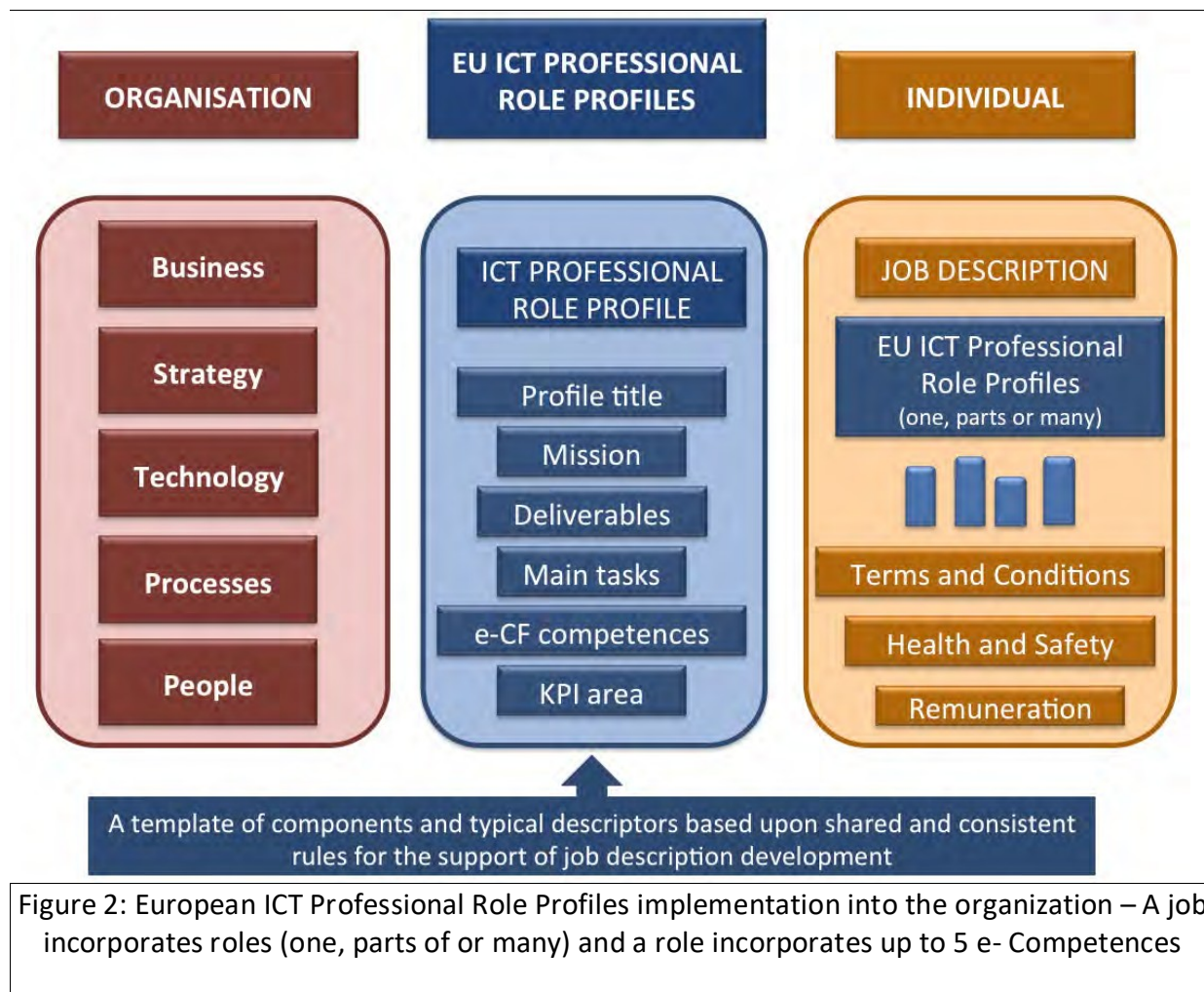
Unfortunately, the framework does not currently capture the full range of ICT jobs. There are many tools complementary to the e-CF. The one is the European ICT Professional Role Profiles contributes to a shared European reference language for developing, planning, and managing ICT Professional needs in a long-term perspective.

The current versions are:

- European ICT Professional Role Profiles version 2: The 30 ICT Profiles (CWA Part 1)
- European ICT Professional Role Profiles Methodology Documentation (CWA Part 3)
- European ICT Professional Role Profiles Case Studies (CWA Part 4).

The function of European ICT Professional Role Profiles is to offer users structure and clarity for designing or identifying and clustering the multitude of activities that are essential to support the digital strategy of an organization. The schematic below (see Figure 2) illustrates these relationships, it shows **how a job incorporates roles and in turn roles incorporate e-competences**.





Specifically, “hybrids,” are often missed or poorly categorized even in European ICT Professional Role Profiles. (Hybrids are individuals who possess deep skills in sales, marketing, project management, regulatory processes, business management, strategy and organizational change, content development and more, but also possess enough knowledge of technology to work directly with technicians or developers). For example, of the five most in-demand digital jobs in EU, four-UX/UI designer, data scientist, full stack development and backend developer-are not even currently included in the list. Similarly, the most in- demand digital job, software developer, is classified as falling under Computer Programmers and Interactive Media. This category includes job titles such as “graphic user interface designer” and “interactive media developer” but excludes “graphic designers and illustrators” and “software engineers and designers”. Further, the employment requirements specify educational requirements that do not take into account UX/UI designers. Overall, job titles that include “design” are particularly prone to mis-categorization because they tend to include diverse training as well as hybrid skills and job roles.

Some studies analyzed job postings to find that three of the four most in-demand job categories - customer relationship management, digital media and design and social media tools and search engine analysis - were all hybrid roles. Critically, these positions all required the ability to use common software, not sophisticated technology skills.

Hybrid workers are particularly valuable because, contrary to people with strictly technical skills, they can work effectively with both clients and developers. Consequently, demand for hybrid roles is growing quickly. While deep technical skills are necessary for some roles, basic

digital literacy and general business and technology skills are sufficient for many day-to-day business functions.

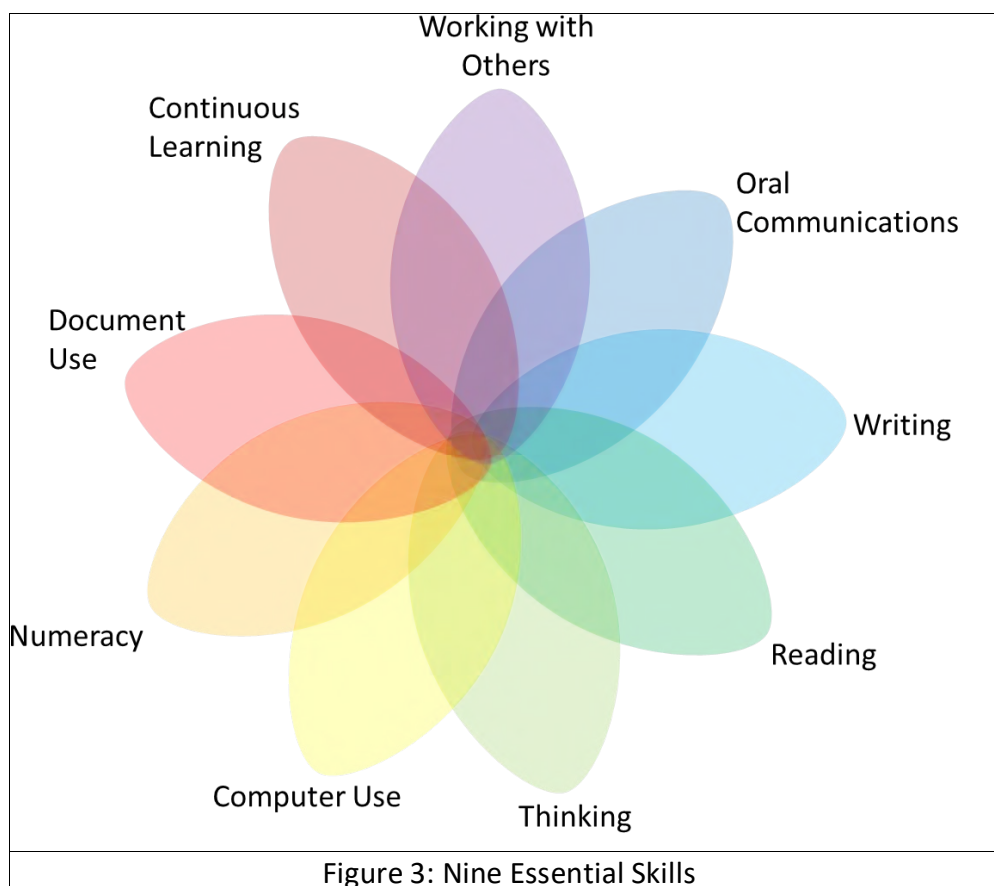
### Shifting Roles

At this time, high rates of displacement were observed among highly skilled “deep” technology occupations such as petroleum engineers and geoscientists, while roles that blended digital skills and competencies, such as software developers, data analysts and UX/UI designers, were in demand. Yet while many people in “deep” technology occupations have the skills for other types of roles—for example, the average geoscientist has nearly 60 per cent of the core skills and competencies needed to become a data analyst—they lacked the skills needed to transfer their expertise to in-demand positions. This was compounded by employers being unaware of these transferrable skills, which represents a significant lost opportunity when the average time required to upskill these workers is a year or less. An improved classification system could potentially alleviate some of these problems and help to ameliorate the digital skills gap.

Research further supports the idea that better mapping of skills and competencies could help employers find the workers with the skills they need and help workers better use the skills they have to find the jobs they want. U.S. Department of Labor’s **Occupational Information Network (O\*NET)** used the database to map occupational codes to skills and found that there is demand for a broad range of skills beyond pure technology. Critical thinking, creativity and flexibility were identified as the most important skills in the hiring process, while active listening, oral expression and inductive reasoning were identified as strongly associated with high-growth occupations. Companies are increasingly recognizing the importance of multiple disciplines as pathways to jobs that rely on digital skills. For instance, a recent survey of skills required to work in artificial intelligence confirmed the importance of deep technology skills as well as sales, marketing, and product-management abilities. Some companies have said that it is easier to take someone with those skills and teach them about technology and to take someone with deep technology skills and teach them how to effectively sell. Accumulating research stresses the importance of non-technical skills even in the technology sector. This message is also echoed by employers, who are looking for candidates with digital capacity and who are fluent with digitally intensive tools, but not at the expense of soft skills, namely “strong interpersonal, project management and problem-solving skills.”

### Essential Skills

Nine essential skills are important and are used to design and assess various skills development initiatives across the country (see Figure 2). Essential skills are the foundation for learning all other skills, and they are what enable people to prepare for, get and keep a job, as well as enable them to adapt and succeed at work.



Academics and organizations are mapping these essential skills to other taxonomies and frameworks and are considering additional skills. Communication, collaboration, critical thinking, problem-solving, flexibility, creativity, entrepreneurial thinking and organizational skills should be included as 21st- century skills.

The World Economic Forum breaks 21-century skills into foundational literacies (how students apply core skills to everyday tasks) including literacy, numeracy, scientific literacy and ICT literacy; competencies (how students approach complex challenges) including critical thinking/problem solving, creativity, communication and collaboration; and character qualities (how students approach the changing environment) including curiosity, initiative, persistence/grit and social and cultural awareness.

While there are common themes among these and other skills frameworks, there is little consistency in the categories and definitions; limited evidence that they can be objectively defined and tested and challenges translating them into frameworks that can be commonly used by employers and other stakeholders.

### Digital Skills Frameworks

As was discussed in the preceding chapter, digital skills and labor shortages are exacerbated by the lack of common nomenclature to define digital skills and a lack of clarity over what qualifies a person to work in a role with significant digital skill requirements. Consequently, various stakeholders have developed digital skill structures, including digital skills maps, toolkits, and frameworks to serve educators, students, policymakers, employers and others. One example, developed by Vu, Lamb and Willoughby, groups digital skills on a continuum to better understand where jobs and skills occur on the spectrum from least digitally intensive to most, and where the demand is. Notably, this framework incorporates

common soft skills that appear with digital skills, such as teamwork, collaboration, and problem-solving.

Unfortunately, in terms of general knowledge and specific ICT knowledge, there are no clear similarities between frameworks, skills maps and toolkits, other than an emphasis on “soft” or “human” skills (see Appendix A). Most frameworks are structured as general learning and pedagogical tools to widely improve digital literacy (e.g., the EU’s DigComp 2.0 map and ITU Digital Skills Toolkit). A few frameworks focus on addressing the digital skills gap in order to support workers in the digital era (e.g., the Brookfield Skills Map and the BTM Learning Outcomes map). Importantly, most frameworks do not identify skills or learner levels, except for Wendy Cukier and colleagues’ Digital Skills and Business School Curriculum and ITU’s Digital Skills Toolkit, which articulate three skill levels.

The project results must have a notable impact on several stakeholders, which is summarized as follows:

- On HEIs: Mitigation of the ICT "skill-crisis" by supporting the design of evidence-based reforms of curricula.
- On students and graduates: Preparation of high ICT-skilled, empowered, motivated and self-confident future professionals.
- On industrial and market stakeholders: Sharing of knowledge and cooperation with the participating HEIs, since academic degrees (Bachelor's and Master's) will be promoted in the eyes of industry and market recruiters, while applied research will be conducted in their premises.
- On society: Linking HEIs and business world is a pre-requisite, especially in South Europe, where the consequences of the on-going economic crises and the resulting unemployment, are more evident. ARRANGE-ICT aspires to offer better job opportunities for graduates and minimize the risk of unemployment, lower wages, and poorer long-term prospects.

### European Attempts

Definitions of ICT professionals’ knowledge, competencies and skills also vary, but, on the whole, frameworks tend to put more emphasis on skill levels. The European e-Competence Framework (e- CF) provides a reference of 40 competencies as applied to the ICT workplace, using a common language for competencies, skills, knowledge, and proficiency levels across Europe. The e-CF was created to provide a generic set of typical roles performed by ICT professionals in any organization and covers the full ICT process. Its five e-CF areas- **plan, build, run, enable, and manage** - are broken down into required competencies and five e-competency levels, from low- or entry-level competency to advanced. Each area provides example skills and knowledge, which allows for individual-level measurement of each competency and specification of skills. It is a comprehensive tool that enables the identification of competencies and skills that are required to successfully perform duties in the ICT workplace.

Other countries have made similar attempts to define an ICT professional’s knowledge, competencies, and skills. Bulgaria’s “MyCompetence.bg” most popular project is very close related with our problems and is a common source for surveys for competences and skills analyze in the countries of our project. Below, such framework is discussed: the ICT Profession Core Body of Knowledge (CBOK) and some others. Appendix A contains a table that



summarizes and compares these frameworks discussed below, as well as other relevant frameworks.

The expanded descriptions below are provided to demonstrate the breadth and the lack of agreement across professional associations globally on how to define the knowledge, competency and skills relating to digital skills generally and ICT specifically. It also shows that there is **little agreement on how to distinguish or measure levels of expertise**.

Australia's ICT Profession Core Body of Knowledge

The Australian Computer Society (ACS) has defined an ICT Profession Core Body of Knowledge (CBOK), which includes six areas of ICT Professional Knowledge:

- ethics;
- professional expectations;
- teamwork concepts and issues;
- interpersonal communication;
- societal issues/legal issues/privacy;
- and understanding the ICT profession and general ICT knowledge (hardware and software fundamentals, data and information management, networking, and technology-building).

The ACS CBOK links to the ICT occupations contained within the Australia and New Zealand Standard Classification of Occupations, identifying 30 different job titles within the ICT field. However, unlike the EU's e-CF, it does not articulate or map specific competencies and skills, or levels of those skills, to the areas of knowledge identified.

### Emerging and Innovative Approaches to Closing the Skills Gap

Despite the definitional and taxonomical problems discussed above-such as the lack of a commonly agreed-upon taxonomy of digital jobs and digital skills-efforts are underway by European governments, educational institutions, and businesses to address digital skills and labor shortages. Emerging approaches to developing and recruiting digital talent focus on inclusive training and recruitment practices; reconsidering credentials and assessment; and training and upskilling.

Inclusive training, recruitment and hiring practices

One of the most obvious anomalies present in the data that describes the skills gap is that even while there exists a clear shortage of skilled technology workers and hybrid workers with digital skills capacities, a variety of equity-seeking groups-particularly highly skilled immigrants and women-are underrepresented in ICT roles and throughout the ICT pipeline.

Despite many explicit corporate commitments to diversity, decades of initiatives designed to advance women in technology have scarcely had an effect: The proportion of women in engineering and computer science in Europe has changed little in 25 years. Limited progress addressing persistent barriers for diverse groups across employment sectors compounds labor and skills shortages. Strategies such as recruitment from particular communities, diversity training and mentoring programs have produced uneven results. Organizations may have significant representation of underrepresented groups but expect them to conform in the workplace. In workplaces where this expectation exists, the gains that can be had from diversity are constrained. Consequently, attention has shifted to the creation of "inclusive" organizations that espouse a commitment to integrating different identities and valuing them. This move aligns with research that has highlighted the importance of a deep understanding of complex interactions between context and organization and individual initiatives and

change, rather than focusing only on individual perceptions. Without systemic change, everyday bias persists, as does the risk of backlash against diversity initiatives.

But for many communities, even these techniques will not be effective. Understanding the specific community in question is essential to successful recruitment. For instance, workplaces can significantly improve the experience of Indigenous employees by providing measures such as mentorship and peer-support schemes for Indigenous members of staff and cultural awareness training amongst non- Indigenous employee groups. Ultimately, however, the continued underrepresentation of many equity-seeking groups shows that significant innovation and work are still needed.

### Credentials, Assessment and Measurement

Historically, employers have viewed credentials as strong indicators of the skills and competencies possessed by an applicant. But with the pace of technological change continuing to accelerate, examining credentials may no longer be the best way of assessing a candidates' job readiness.

Google, Apple and IBM have decided that a university degree is no longer the best indicator of a candidate's aptitude, and technology companies including Shopify, Telus and Slack are either relaxing or phasing out educational requirements and identifying talent in new and novel ways. Thus, even though studies suggest that post-secondary education, particularly in STEM fields of study, increases the likelihood of acquiring employment in an ICT occupation by as much as 15 per cent, there are increasingly other pathways into tech jobs. Indeed, most of the women who lead the largest ICT companies in the U.S. do not have computer science or technology degrees.

All training material that will be developed within ARRANGE-ICT will be recognized as valid across EU, since it will incorporate the **ECTS credit based** system, in order to serve in any BSc/MSc program as part of valid courses, enabling thus the trainees to further pursue broader interests in ICT sector. Moreover, students completing the corresponding courses will be also awarded respective certificates supplementary to their degrees. It is noted that the individual courses, which will be updated and tailored to advance ICT employability skills, are already parts of widely recognized and accredited higher education programs. Short term training courses as well as the accreditation of the ICT skills gained for students and graduates via EUROPASS, will be continued for at least *five* years in our ARRANGE-ICT environment.

ECTS for programme design, delivery and monitoring deals with the design of educational programmes by higher education institutions (HEIs) or by other providers. The use of ECTS credits aids programme design by providing a tool which improves transparency and helps to engender a more flexible approach to curriculum design and development.

There are two European Qualifications Frameworks: the Framework for Qualifications of the European Higher Education Area (QF-EHEA) and the European Qualifications Framework for Lifelong Learning of the EU (EQF-LLL). Both frameworks use learning outcomes to describe qualifications (e.g. Bachelor, Master, Doctor) and are compatible with each other as far as Higher Education is concerned (QF-EHEA cycles 1, 2 and 3 correspond to EQF-LLL levels 6, 7 and 8) and cover qualifications at ISCED levels 6, 7, 8. In the QF-EHEA, three main cycles, as well as a short cycle, are identified and described by the so-called Dublin Descriptors, in terms of: applying knowledge and understanding, making judgments, communication skills, and learning to learn. The short, first and second cycles are also characterised by credit ranges:

- Short cycle qualifications typically include approximately 120 ECTS credits.
- First cycle qualifications typically include 180 or 240 ECTS credits.

- Second cycle qualifications typically include 90 or 120 ECTS credits, with a minimum of 60 ECTS credits at the level of the second cycle.
- The use of ECTS in the third cycle varies.

The EQF-LLL describes 'levels of qualification' (without indicating any credit ranges) – to provide a common reference framework which assists in comparing the national qualifications systems, frameworks and their levels. It is based on eight levels.

As an instrument for the promotion of lifelong learning, the EQF encompasses general and adult education, vocational education and training as well as higher education.

The eight levels cover the entire span of qualifications from those achieved at the end of compulsory education to those awarded at the highest level of academic and professional or vocational education and training.

Each level should in principle be attainable by way of a variety of education and career paths. Learning outcomes are specified in three categories – as knowledge, skills and competence. This signals that qualifications – in different combinations – capture a broad scope of learning outcomes, including theoretical knowledge, practical and technical skills, and social competences where the ability to work with others will be crucial. The different cycles of QF-EHEA are referenced to the levels of EQF-LLL as follows:

- Short-cycle qualifications at level 5 First-cycle qualifications at level 6
- Second-cycle qualifications at level 7
- Third-cycle qualifications at level 8

National education systems may include levels other than those included in the overarching frameworks as long as national frameworks are self-certified and referenced against the QF-EHEA and the EQF. For example, while the EQF comprises 8 levels, the number of levels in national frameworks currently ranges from 7 to 12. Therefore, the fact that short cycle qualifications are included in the QF-EHEA does not oblige countries to include such qualifications in their national frameworks but it gives explicit recognition to the fact that many national frameworks do include short cycle qualifications.

Employer and recruiter perspectives vary on the importance of traditional credentials, depending on the job title and skills required. For instance, Randstad, a human resources services firm, states that business systems analysts typically need to hold an undergraduate degree in an IT-related field, and some may need a graduate degree. However, web developers can have a degree or diploma from a wider range of fields, including computer science, communications, business, or design. A computer science degree and a design degree are very different, yet both may be suitable for the same job.

Further, in some cases, self-taught web developers with an impressive portfolio of work may be able to altogether bypass formal education requirements. This message is echoed in many reports, where their analysis emphasized the importance of mixed skills. Notably, their data are reflective of employer beliefs about the roles and skills needed for their organization, which did not always reflect credentials.

In *Future Computed*, Microsoft president Brad Smith and executive vice president of artificial intelligence and research Harry Shum emphasize that lessons from a liberal arts education are necessary for the proper development of people who work with artificial intelligence (AI), stating that:

skilling-up for an AI-powered world involves more than **science, technology, engineering, and math-STEM**. As computers behave more like humans, the social sciences and humanities will become even more important. Languages, art, history, economics, ethics, philosophy,

psychology, and human development courses can teach critical, philosophical, and ethics-based skills that will be instrumental in the development and management of AI solutions.

Employers are finding it increasingly difficult to evaluate the legitimacy and quality of training and education programs. In response, portfolio approaches (including e-portfolios), “**badging platforms**,” **hackathons** and **work-integrated learning** are increasingly being used by employers to assess competencies, particularly as more job-seekers have diverse backgrounds and as jobs are changing.

New techniques designed to test and recognize these credentials are emerging, including self-assessments to test attitudes and behaviors; general standardized tests to assess essential skills; and tests to measure skills in specific tools or techniques (with the latter often provided by the industry leader who makes or distributes the tool as shown in Appendix C). But it’s not clear whether individuals can accurately and objectively assess their own skills and skill levels, and there is debate about whether the onerous, often time-consuming and unpaid assessment and interview process is fair to candidates; some see it as exploitation in the recruitment process.

### Training and Upskilling Programs

Post-secondary institutions are developing programs to better respond to industry needs. Examples include the Queen’s University MBA in Artificial Intelligence and the George Brown College Bachelor of Digital Experience Design. The changes are not limited to post-secondary institutions; there is growing emphasis on digital skills in public elementary schools, and many provinces are making coding a mandatory part of the primary or secondary curriculum.

At the same time, traditional educational institutions take a long time to add to or adapt curricula or programs, which has meant that higher education often lags behind industry. The resulting education and training void has increasingly been filled by innovation centers in post-secondary institutions, public online platforms, private training companies and government-funded upskilling programs.

Short training programs (e.g., Bitmaker, Brainstation, Miami Ad School) focus on specific tools or techniques. Some company and public-sector organization upskilling programs—such as those at AT&T and Amazon Web Services—upskill existing employees. Work-integrated learning (WIL) programs (e.g., nPower and ADaPT) are also working to upskill and reskill workers. New programs, such as Skills for Change, develop pathways for internationally educated individuals in ICT trades and professions to shift from one sector to another or seek to level the field for underrepresented groups in technology. Appendix B identifies some of these training and upskilling models.

The ADaPT (Advanced Digital and Professional Training) program is one example of a stand-alone, employer-driven WIL skills development and work placement program for recent graduates, run by Ryerson University. ADaPT addresses the skills gap between employer needs and graduate skills by providing intensive training for university graduates or senior students that is adjacent to, but not embedded in, formal programming. It is conducted in **collaboration with employers** and industry partners in the **form of a paid work term**. This program is particularly innovative because it recruits from across the social sciences, offering graduates from non ICT-specialist programs an opportunity to grow their capacities in digital literacy, communications and business financials. Short work placements with industry partners help graduates amplify their non-cognitive soft skills with practical

experience and technical know-how. WIL programs such as ADaPT are designed to respond to changing trends in global workforces that forecast a growing demand for these non-technical skills.

Figure 4: Sample for Employer-driven WIL skills development and work placement program

Many companies and organizations outsource to third-party training companies to train employees in digital skills. For example, Google, RBC, Uber and Deloitte use Brainstation to offer courses in design, data and development. Udacity has been used by companies such as AT&T to train staff in data science, machine learning and artificial intelligence, business and marketing, web programming, cutting-edge technology and mobile programming. Galvanize is similar to Udacity in its training delivery but focuses on training employees in a range of technology skills using cloud computing.

Training and upskilling is big business. Coding boot camps alone are estimated to be a \$240-million business in North America. Lighthouse Labs, Red Academy, HackerYou and others offer intensive coding training (in as few as 10 weeks) focused on hands-on experience and placing participants in jobs. Lighthouse Labs claims that 93% of its graduates are hired within **120 days** of program completion.

While the approaches to addressing the skills gap discussed above provide a sense of both the problem and potential solutions, much is still unknown about the effectiveness and outcomes of relying upon different skills frameworks. Further, where different methods are being applied to try to close the skills gap, there is as yet inadequate data to understand whether these actions are serving to address skills and labor-market shortages.

#### Last Year New Classifications: Next Steps

Digital skill and labor shortages are the product of multiple overlapping challenges, including the limitations of ICT occupational definitions; the difficulties inherent in identifying “digital skills;” the lack of consistency around digital skills/competency frameworks; and employers limiting their recruitment and retention practices in ways that disproportionately exclude certain populations. Opening new pathways for people to work in digital jobs-or to acquire the necessary digital skills to do their job in workplaces of the future-requires clarity and consistency in defining jobs and skills, innovation in skills development programming, and changes to how employers’ hire, train and retain skilled workers.

There is general agreement that there is a need to reduce the conceptual confusion between a job, the skills needed to perform a job and the tools used to complete it. Part of this problem stems from the fact that existing classification systems, while helpful for more traditional occupation groupings, are not yet capturing emerging or hybrid-roles sufficiently.

There is also increasing acceptance of the need to focus on skills rather than credentials. In support of this, there are a number of emerging and innovative approaches that can, and are increasingly being used to, fill the perceived shortage of skilled workers, including corporate-upskilling initiatives, event- style recruitment (Hackathons) and HR services dedicated to sourcing tech-talent. This report’s appendices provide data on digital skills frameworks (Appendix A), digital training models (Appendix B) and assessment tools (Appendix C). This data may form the foundation for research and further reviews on the state of the field of approaches to addressing the skills gap.



Moving forward, there is a need to promote the development, identification and support of a larger group of standard definitions and approaches to make significant progress on digital skills. Indeed, an over-abundance of skills frameworks, training models and assessment tools is one of the sources of existing confusion and uncertainty around the best way to make progress in this area. Achieving agreement on a set of standard definitions and approaches will not be simple or easy, but doing so will be an important step forward because it will help provide a foundation for the deployment, monitoring and assessment of new and emerging approaches to digital skills identification, development and employment. In so doing, such agreement will help open new pathways to digital skills, especially for those who are currently under presented, thereby creating an exciting opportunity to close the digital skills gap.

## Guide for Instructors

This intellectual output in the project is the design and completion of a thorough guide for instructors. The guide will be developed based on the findings and feedback received by fine-tuning the Smart Job Hub and the exchange of good practices and experience among educational and industrial stakeholders. The guide will detail the resulted practices and will provide valuable instructions for the design and delivery of courses inspired by the identified megatrends, in an effort to alleviate the skills gap. This is an innovative tool that can be employed by any HEI (not just the ones participating in the consortium) that needs and intends to update its modules according to the latest major ICT industry trends. For that purpose, the output will be publicly available. The specific output will be developed during Phase 4 "Capacity building driven by megatrends." TUS will lead the tasks in the context of the specific activity with all partners participating. The methodology to be followed initially involves the exploitation the feedback received by participants and users of the Smart Job Hub. The academic partners will have a dominant role in designing the instructors' guide, with the industrial partner providing valuable input towards aligning the expected Learning Outcomes with the market needs. In the beginning, the aims and general descriptions of the related courses will be completed.

The next step includes finalization of Learning Outcomes, assessment methods, and course structure. Finally, an evaluation process will ensure full alignment of the guide with the identified megatrends in ICT.

## Smart Job Hub- the Work Field for Project Findings and Online Tests

The platform Smart Job Hub enables three different roles: **graduate**, **employer** and **academia** and each role have different capabilities and different panels, as their needs and their goals are different. The employer (industry or start-up) mainly seeks for employees and secondly for educational programs with graduates equipped with skills that fit the demands of the available vacancies. The graduates follow a similar path, looking for jobs that fit their skills and for educational programs that cover the skills in demand from the employers, while the academia examines the needs of the market and designs accordingly educational programs capable to cover the skills gap. In the remainder of the section some more details of each role are presented.

**Graduate** (or job seeker), is the individual who enters the platform and she/he is looking either for the available jobs either for the available education programs. Another important functionality for the graduate is the creation of resume(s) and the capability to apply to

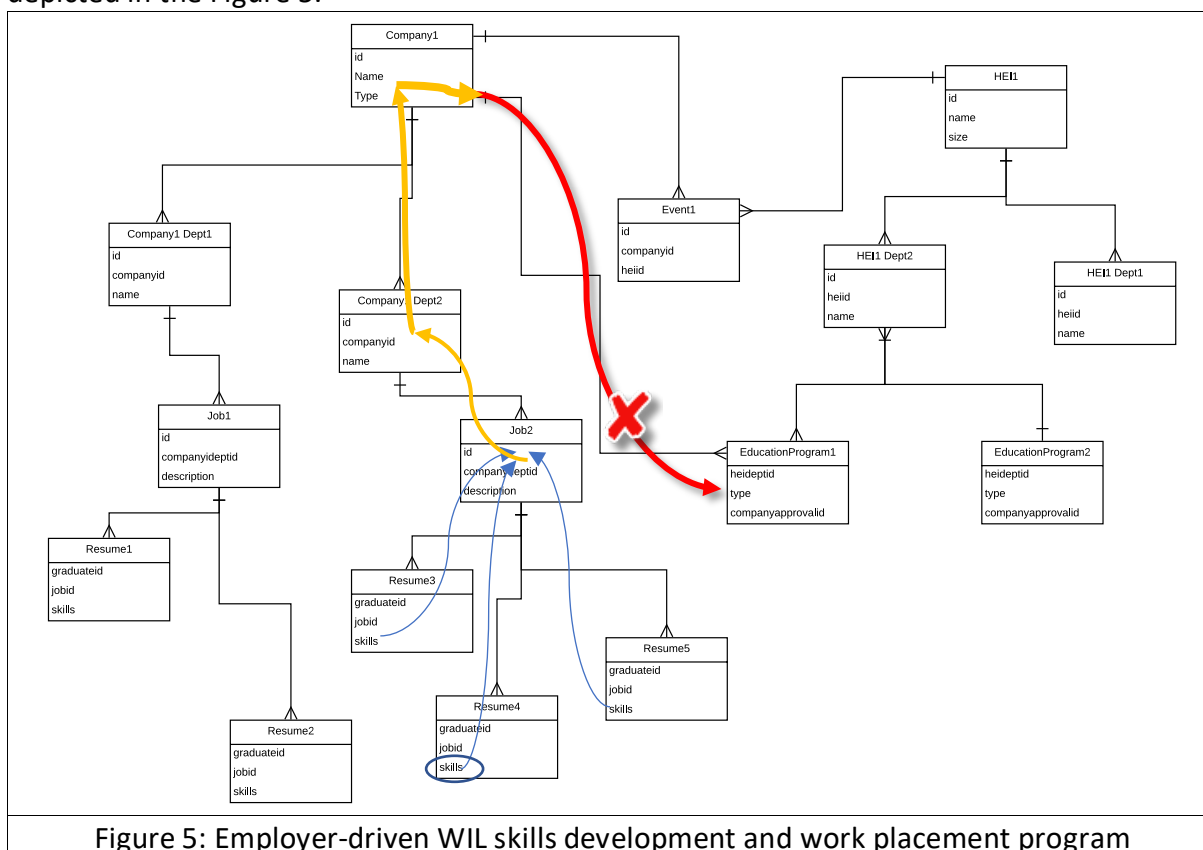
different job posts. The user can alternatively register via her/his account on LinkedIn or Facebook, based on what she/he decides and browse recent posted jobs and search for jobs that meet some criteria.

**Employer**, the role of the employer is for the users who enter the platform aiming at finding new employees for their companies. The employer has four basic functionalities, creation of company (or companies), creation of the departments of the company (if applicable), posting job that would be filled from the job seekers of the platform and search for the available resumes in the platform.

A user registered as **Academia**, has four main functionalities, the creation of HEI(s) and their departments, creation of education programs and creation of events. For the last two functionalities, users registered as employers have the capability to approve an education program (if asked) and eventually be considered as co-creators of the program.

The entities are created and modified from the users of the platform and indicate either organizations, functions or services. The entities of the platform are companies, companies' departments, jobs, resumes, HEIs, HEIs departments, education programs and events.

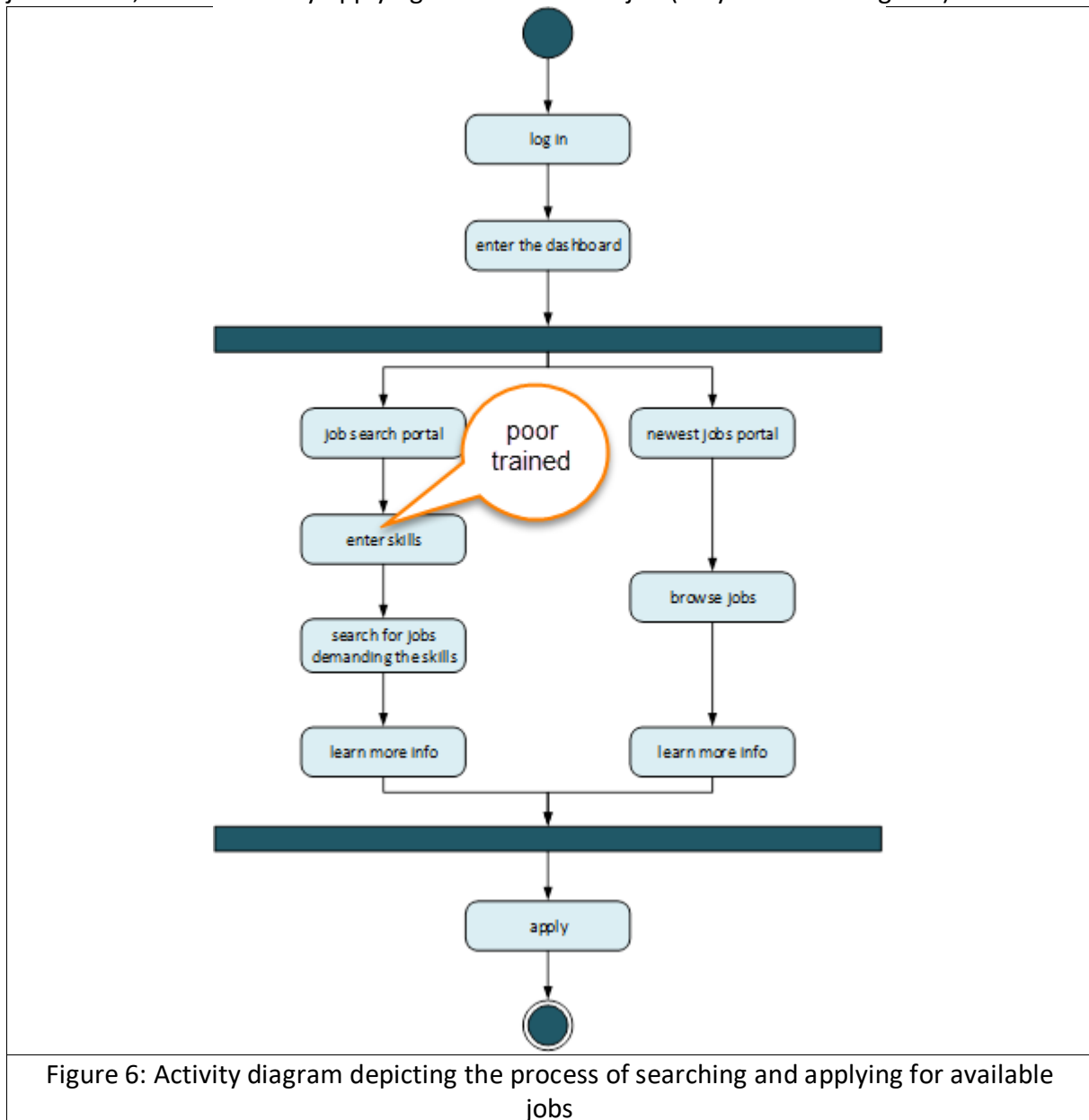
Each role interacts differently with the available entities; hence graduates look for jobs and educational programs, build resumes and apply for jobs. The employers create companies and companies' departments, post available jobs, look for candidates and education programs that fit their needs. The basic hierarchy and interactions between the entities are depicted in the Figure 5.



After intensive tests and careful analyze of dissemination results and other project activities problem was detected in the selected way to define Essential Skills, Digital Jobs and Industries, the lack of working standards for Recruitment and Hiring Practices for Credentials, Assessment and Measurement. Skills and competencies in the current unit Resume and EducationProgramm are nor separated or exactly explained. The **Graduate/Job seeker/Individual** has no choice to add individual skills tied to particular professions and

selects any from a common list. Current labor-market needs some measurement approaches, to accurately measure in-demand skills and competencies. The **Employer**, who enters the platform aiming at finding new employees for their companies finds only competencies instead of skills and often fails to submit the right feedback to HEIs.

Some indicative activity diagrams in ARRANGE-ICT are illustrated, demonstrating some of the static and old fashion actions the user may take, when entering the platform. The next diagram (Figure 6) illustrates the user entering the platform, searching for a job either by browsing either by providing skills (without any standard or clarification) that are demanding from the job market, and eventually applying for the available job (may be the wrong one).



Browsing categorized and somehow measured skills that are required in the market, identifying the gaps between existing education programs, design the new education system with a possible synergy with the companies that exist in the platform and eventually provide the education program to graduates, that makes this project to keep up with the demands of the market in our countries.



## Prepare a Course for ARRANGEmyICTCareer Plan

“Prepare a Course for ARRANGEmyICTCareer” (Figure 7) is guided to Instructors, Academia, Enterprises and Students from ARRANGE-ICT. Very important for the project is to develop deeper sense to ICT digital and soft skills. ARRANGEmyICTCareer seems to be exciting for the young talent. He needs to have the strategic vision and planning and the purpose of this digital and ICT strategic planning can be summarized as follows:

- Addresses how services can be transformed to support future business needs and consumer expectations; and discovers likely benefits, costs and risks.
- Creates visions, strategies, roadmaps and plans that link digital investments to business strategies.
- Draws on knowledge acquired through enterprise architecture, innovation, digital disruption and co-design processes to find digital approaches to business opportunities and problems. It also includes information management and information sharing activities that support effective delivery of services, and the foundation for future service design activities.
- Provides plans that are critical input to the investment governance process. These investment plans provide decision makers with a forecast view of digital investment opportunities including benefits, cost, risks and the incremental transformation of services with sufficient detail to support strategic and tactical investment planning.

Is it true that in this course with couple of days duration achieving strategic planning is only a dream, but the first step maybe?

The gain of this course is also for the Instructors, HEIs and Enterprises. This is very easy way to coordinate in the platform “Smart Job Hub” the three different roles to have same way to find and understand standard definitions and approaches to make significant progress on digital, soft skills and competences. The “Course for ARRANGEmyICTCareer Plan” teaches the students that career is a teamwork, cooperation and not only the Employer is involved in process, Academia and the society are teamed too.

“Course for ARRANGEmyICTCareer Plan” Prepare external tools:

- Jobs Skills Guide
- Digital Literacy Guide
- Resume Writing Guide
- Social Media Guide

Short title	Cntry	Key challenges addressed
EURES	EU	improve matching between skills and jobs improve guidance/employment services raise guidance awareness tackle unemployment
Europass	EU	promote self-assessment tackle unemployment increase the mobility of people in Europe for education and employment purposes
MyCompetence	BG	improve matching between skills and jobs promote self-assessment aid transition from school education to career selection improve guidance/employment services
National careers service	UK	improve matching between skills and jobs aid transition from school education to career selection promote self-assessment improve guidance/employment services tackle unemployment knowledge exchange (among education professionals, guidance counsellors, etc.) provide information on education opportunities raise guidance awareness

LMI for ALL	UK	improve matching between skills and jobs aid transition from school education to career selection improve guidance/employment services
Professions in the picture	NL	improve matching between skills and jobs promote self-assessment aid transition from school education to career selection improve guidance/employment services knowledge exchange (among education professionals, guidance counsellors, etc.) raise guidance awareness tackle unemployment
Online tools of BiWi	AT	improve matching between skills and jobs promote self-assessment aid transition from school education to career selection improve guidance/employment services tackle unemployment
Pathfinder service	EE	improve matching between skills and jobs promote self-assessment aid transition from school education to career selection improve guidance/employment services knowledge exchange (among education professionals, guidance counsellors, etc.) raise guidance awareness tackle unemployment
Figure 7: Prepare external tools- links		

Note: Column Ref. links to external tools

		<b>Programme:</b>	Erasmus+	Ref.
		<b>Key Action:</b>	Cooperation for innovation and the exchange of good practices	T001
		<b>Action:</b>	Strategic Partnerships	T002
		<b>Which field is the most impacted:</b>	Strategic Partnerships for higher education	T003
		<b>Project Title:</b>	pArtneRship foR AddressiNG mEgatrends in ICT	T004
		<b>Project Acronym:</b>	ARRANGE-ICT	T005
		<b>Output Identification:</b>	04	T006
		<b>Output Title:</b>	Guide for Instructors	T007
		<b>Output Description (including elements of innovation, expected impact and transferability potential):</b>	This intellectual output is the design and completion of a thorough guide for instructors. The guide will be developed based on the findings and feedback received by fine-tuning the Smart Job Hub and the exchange of good practices and experience among educational and industrial stakeholders. The guide will detail the resulted practices and will provide valuable instructions for the design and delivery of courses inspired by the identified megatrends, in an effort to alleviate the skills gap. This is an innovative tool that can be employed by any HEI (not just the ones participating in the consortium) that needs and intends to update its modules according to the	T008

			latest major ICT industry trends. For that purpose, the output will be publicly available.	
		<b>Output Type:</b>	Learning/ teaching/ training material-Manual/ handbook/ guidance material	T009
		<b>Please describe the division of work, the tasks leading to the production of the intellectual output and the applied methodology:</b>	The specific output will be developed during Phase 4 "Capacity building driven by megatrends." TUS will lead the tasks in the context of the specific activity with all partners participating. The methodology to be followed initially involves the exploitation the feedback received by participants and users of the Smart Job Hub. The academic partners will have a dominant role in designing the instructors' guide, with the industrial partner providing valuable input towards aligning the expected Learning Outcomes with the market needs. In the beginning, the aims and general descriptions of the related courses will be completed. The next step includes finalization of Learning Outcomes, assessment methods, and course structure. Finally, an evaluation process will ensure full alignment of the guide with the identified megatrends in ICT.	T010
		<b>Course Name:</b>	Prepare a Course for ARRANGEmyICTCareer Plan	T011
				T012
				T013
		<b>Main Idea:</b>	Students research ICTCareers and training programs to make an informed decision about their future. By doing a little research in advance, students can save time and money. Students will create a ICTCareer plan by completing the following units.	T014
		<b>Notes:</b>	Student will use the videos, articles, and interactive tools available in their ARRANGE-ICT <b>WorkNotepad</b> Employment Guide.	T015
			They will record their responses in their ARRANGE-ICT WorkNotepad Employment Guide.	T016
				T017
				T018
		<b>Units:</b>	Explore ICTCareers	T019
			Explore Training	T020
			Get Qualified	T021
		<b>Time Allotment:</b>	1.5 Days	T022
		<b>Module: Prepare a Course for ICTCareer Plan: Standards Used:</b>		T023
<b>Module: Prepare a</b>		Standards of a Literate Student and Literate		T024
		They demonstrate independence		T025
		They build strong content knowledge		T026
		They use technology and digital media strategically and capably		T027
		Common Core Anchor Standards		T028
		Integrate and evaluate content presented in diverse formats, including visually and quantitatively as well as in words		T029

		Read and comprehend complex literary and informational texts independently and proficiently.	T030	
		Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation	T031	
		Some Standards for Social/Emotional Learning	T032	
		Recognize personal qualities and external supports	T033	
		Demonstrate skills related to personal and academic goals	T034	
		Apply decision-making skills to deal responsibly with daily academic and social situations	T035	
		Standards_for_Students	T036	
		Students will acquire the skills to investigate the world of work in relation to knowledge of self and to make informed ICTCareer decisions.	T037	
		Students will employ strategies to achieve future career goals with success and satisfaction.	T038	
		Students will understand the relationship between personal qualities, education, training and the world of work.	T039	
		Students will make decisions, set goals and take necessary action to achieve goals	T040	
		Business Education Standards	T041	
		Assess personal skills, abilities, and aptitudes and personal strengths and weaknesses as they relate to ICTCareer exploration and development.	T042	
		Apply knowledge gained from individual assessment to a comprehensive set of goals and an individual ICTCareer plan	T043	
	Explore ICTCareers Unit - Lesson 1: Discover ICTCareers that match your interests.		T044	
Explore Careers Unit	Lesson 1: Discover ICTCareers that match your interests	Objective:	Identify and use a career interest survey that can be used to match student interests to potential ICTCareer paths. They will complete at least one of the interest inventories and save their results.	T045
		Summary:	Students will discuss the benefits of selecting a ICTCareer path that matches their interests. They will review four different types of ICTCareer interest inventories available	T046
		Discussion Questions:	Do you know what ICTCareer or career field that you want to go into?	T047
			How did you make that decision?	T048
			What can you do to help you make that decision?	T049
			Have you ever talked to someone who loves their job?	T050
			Someone who dislikes their job?	T051
			Why do they like or dislike their job?	T052
			Why is it important to select a ICTCareer path that matches your interests?	T052
		Activities:	Provide an overview of the ICTCareer interest inventories available in the list.	T053
			Interest Profiler	T054
			SKILLS Profiler	T055
			Work Importance Locator	T056

			ICTCareer Cluster Profiler		T057	
			Students complete the ICTCareer Cluster interest inventory.		T058	
			Student will use their results as a starting point to explore ICTCareers in the next step.		T059	
		Explore ICTCareers Unit - Lesson 2: Explore jobs, required skills/credentials, and wage information.			T060	
Explore ICTCareers Unit	Lesson 2: Explore jobs, required skills/credentials, and wage information	Objective:	Define and locate occupational information.		T061	
		Summary:	Students will discuss the examples of occupational information and identify why each is important to consider. Students will review occupational information for ICTCareers that match their interests and record their findings.		T062	
		Discussion Questions:	If you were going to interview a person to learn about their job what would you ask? What is the salary range for the job? What do they do in their job? How long did they have to go to school?		T063	
			What is Labor Market Information? How would you feel if you spent your time and money to get trained and then you could not find a job?		T064	
			What is occupational information? What are some examples of occupational information that you should consider when selecting a ICTCareer?		T065	
		Activities:	Review the related resources.		T066	
			Students look up the ICTCareer information in the list for the career that match their interests (based on the interest survey results in lesson 1).		T067	
			Students record their findings in their ICTCareer plan form.		T068	
		Explore ICTCareers Unit- Lesson 3: Identify your soft skills that are required for all ICTCareers			T069	
Explore ICTCareers Unit	Lesson 3: Identify your soft skills that are required for all ICTCareers	Objective:	Identify soft skills and demonstrate an understanding of the importance of good soft skills in the workplace.		T070	
		Summary:	Students will learn that soft skills are required regardless of the industry they pursue. They will identify their current soft skills and how those skills are useful in the workplace.		T071	
		Activities:	Break into small groups and assign each group a soft skill area.		T072	
			Group 1	Group 2	Group 3	T073
			Communication	Positive Attitude Work Ethic	Leadership and Teamwork	T074
			Reasoning/Problem Solving	ICTCareer Development	Attendance and Self-presentation	T075
			Understanding the Big Picture		Independence and Initiative	T076
			Students discuss the scenarios and watch the videos.		T077	
			Groups identify their top 5 soft skills and provide an example of why this would be important in the Workplace.		T078	
			Groups present the information to all groups.		T079	
			Students identify their soft skills.		T080	

	<b>Discussion Points:</b>	Workplace evaluations include soft skills.	T081
		Soft skills should be incorporated into your resume.	T082
		You can start working on improving your soft skills today!	T083
		Communication: List different ways to communicate information to a group or individual.	T084
		Problem Solving: What are the basic steps to problem solving?	T085
		Big Picture: What is a mission statement and how is it different than company policies and procedures? What other policies can affect a company?	T086
		Positive Attitude: Explain how your attitude can have a positive or negative affect at work.	T087
		Work Ethic: How can you show ethical behavior at work?	T088
		Leadership and Teamwork: What are some characteristics of a good team member?	T089
		Attendance and Self-Presentation: List examples of professional behavior.	T090
		Independence and Initiative: List examples of showing initiative.	T091
		<b>Explore Careers Unit - Lesson 4: Identify your technical skills, transferable skills, and personal</b>	
<b>Lesson 4: Identify your technical skills, transferable skills, and personal beliefs.</b>	<b>Objective:</b>	Identify their transferable skills and explain the importance of selecting a ICTCareer that lines up with their personal beliefs.	T093
	<b>Summary:</b>	Students will discuss the different types of skills they have acquired from past experiences and how they can transfer to their future ICTCareer path. They will also discuss the importance of selecting a ICTCareer that lines up with their personal beliefs.	T094
	<b>Activities:</b>	Review the related resources.	T095
		Students develop a list of their values and then prioritize the list.	T096
		Students develop a list of transferable skills.	T097
		Students review the occupational information for previously selected ICTCareers and identify pros/cons for selecting each ICTCareer path. They should take their identified skills and personal beliefs into consideration.	T098
		Students record their findings in their ICTCareer plan form.	T099
	<b>Discussion Points:</b>	What are values?	T100
		How do values help you?	T101
		Why is it important to identify your personal values?	T102
		What are transferable skills? How do you gain transferable skills?	T103
		Describe self-management skills.	T104
		What are examples of self-management skills?	T105
		What are example of job/technical skills?	T106
	<b>Explore Training Unit - Lesson 1: Learn about compare training program pros and cons.</b>		



Explore Training Unit	Lesson 1: Learn about compare training program pros and cons.	<b>Objective:</b>	Demonstrate ability to locate training program information that is necessary to make an informed decision when selecting a training program.	T108	
		<b>Summary:</b>	Students will review training programs and identify the cost associated with specific training programs. They will consider their options for paying for training and supporting themselves while in the program. They will use this information to identify the pros/cons for each training program.	T109	
		<b>Activities</b>	Review related resources.	T110	
			Students consider the facts and identify the pros and cons for each training program.	T111	
			Students identify realistic options to pay for school.	T112	
			Students identify realistic options to support themselves while in school.	T113	
		<b>Discussion Points:</b>	What are some things that you learned about training programs that you didn't previously consider?	T114	
			What are some options for paying for training? What are the pro/cons for these options?	T115	
			How would you support yourself while in training? Why is this important to consider?	T116	
	Explore Training Unit - Lesson 2: Identify training programs for ICTCareers that match your skills and interests				T117
	Lesson 2: Identify training programs for ICTCareers that match your skills and interests.	<b>Objective:</b>	Locate training programs based on occupation title.	T118	
		<b>Summary:</b>	Students will identify training programs related to the ICTCareers they previously selected. They will review the training program information and select training programs to compare.	T119	
		<b>Activities:</b>	Students select one of their previously saved ICTCareers in their career plan. Then they select the "Career Information" link to display training program information.	T120	
			Students review <u>general</u> training program information related to previously selected ICTCareers.	T121	
			Students select the link to search for Training Providers to learn more about specific training programs. Students identify up to three general training programs.	T122	
			Students record their findings in the ICTCareer plan fields.	T123	
		<b>Discussion Points:</b>	What are some different types of training programs?	T124	
			What should you take into consideration when reviewing training programs? Why?	T125	
			When choosing a training program, you should consider the job market for that ICTCareer. This information is also called?	T126	
			What do training program costs include?	T127	
	Explore Training Unit - Lesson 3: Analyze your options.				T128
	Lesson 3:	<b>Objective:</b>	Analyze ICTCareer and training program information to determine their best ICTCareer path options and their	T129	

		willingness/ability to complete the program and gain employment.	
	Summary:	Students use the information to help them determine if the results for completing training/earning a credential(s) is worth the amount of time/money invested in training.	T130
	Activities:	Review related resources. <ul style="list-style-type: none"><li>a. the Europass curriculum vitae (completed by the individual for qualifications, professional experience, skills and competences);</li><li>b. the Europass language passport (completed by the individual for language skills);</li><li>c. the Europass certificate supplement (issued by the authorities that award vocational education and training certificates, to add further information, make them more comprehensible to employers and institutions outside the issuing country);</li><li>d. the Europass diploma supplement (issued by higher education institutions along with graduates’ degrees or diplomas, to make them more comprehensible outside the country awarded;</li><li>e. • the Europass mobility document (records all organised period of time that a person spends in another European country for the purpose of learning or training).</li></ul>	T131
		Students review their current ICTCareer plan (View My Plans) and compare the careers and related training programs.	T132
		Students rate their return on investment. Bottom Line: Is the time and money invested in training going to be worth it?	T133
		Discussion Points:	Are you willing to invest the time, energy, and money into becoming qualified for the job?
	Once qualified, do you expect there to be job openings?		T135
	Are you willing to relocate for the job?		T136
	Will wages/salary allow you to support the lifestyle you desire?		T137
	Get Qualified Unit - Lesson 1: Make a plan.		
Get Qualified Unit Lesson 1: Make a plan.	Objective:	Describe and create S.M.A.R.T Goals.	T139
	Summary:	Students will identify short-term goals and action steps that are S.M.A.R.T (Specific, Measureable, Attainable, Realistic, and Timely).	T140
	Activities:	Review related resources.	T141
		Students write at least one short term goal and identify the basic steps to achieve goals. Each step includes a deadline date.	T142
		Students identify strategies for staying motivated while working towards reaching their goal.	T143
		Students identify potential problems and identify a solution or backup plan if the problem occurs.	T144



	<b>Discussion Points:</b>	What is the difference between a long term and short term goal? What are some examples?	T145	
		What does S.M.A.R.T. goals stand for?	T146	
		What are attainable and realistic goals? (i.e., Attainable: I have the skills, ability, and tools needed to go become a professional basket weaver. Realistic: I have the ability weave high quality baskets, but I can't support my family on the income.)	T147	
		What does a ICTCareer plan include? What are some examples?	T148	
		What are some ways to stay motivated while in training or searching for a job?	T149	
		What are some potential problems could keep you from reaching your goals? What are possible solutions?	T150	
		<b>Get Qualified Unit - Lesson 2: Apply for training programs and financial aid.</b>		T151
		<b>Lesson 2: Apply for training programs and financial aid.</b>	<b>Objective:</b>	Describe the different types of financial aid and how to apply to training programs.
<b>Summary:</b>	Student will learn about searching and applying for financial aid. They will also learn general information about applying for a training program.		T153	
<b>Activities:</b>	Review the related resources.		T154	
	Discuss the different types of financial aid.		T155	
	Discuss where to find financial aid sources and what to consider when you apply.		T156	
	Discuss the basic steps or things to consider when applying for a training program.		T157	
<b>Discussion Points:</b>	What are some examples of financial aid? What is the major difference between the types of financial aid?		T158	
	What type of financial aid do you have to repay?		T159	
	What are some things to consider or required documents that are needed when you apply for financial aid? Training programs?		T160	
<b>Get Qualified Unit - Lesson 3: Complete training and earn credentials.</b>			T161	
<b>Lesson 3: Complete training and earn credentials.</b>	<b>Objective:</b>	Describe the benefits of earned credentials.	T162	
	<b>Activities:</b>	Review related resources.	T163	
		Discuss different types of credentials.	T164	
		Discuss how to learn about credentials for various fields of study.	T165	
		Discuss tips for preparing for licensure/credential testing.	T166	
	<b>Summary:</b>	Students will learn the benefits of earning credentials and how to learn more about credentials in their field of interest.	T167	
	<b>Discussion Points:</b>	Did anyone select a ICTCareer that required licensure or credentials?	T168	
		What are some of the benefits of having credentials?	T169	

			What are some of things to consider when planning to earn a credential? Mental/physical preparation? Financial preparation?	T170
		<b>Extra Activity:</b>	Get your employers perspective. What licensure or credential are required for their ICTCareer field?	T171
				T172

### ARRANGEmyICTCareer Reference: T024- T043

<a href="http://www.corestandards.org">www.corestandards.org</a>	T024
#1) of Common Core Standards Capacities of a Literate Student	T025
#2) of Common Core Standards Capacities of a Literate Student	T026
#6) of Common Core Standards Capacities of a Literate Student	T027
<a href="http://www.corestandards.org">www.corestandards.org</a> )	T028
Reading, #7) of Common Core Anchor Standards	T029
Reading #10) of Common Core Anchor Standards.	T030
Writing, #7) of Common Core Anchor Standards	T031
ESCO implementation manual - European Skills, Competences, Qualifications and Occupations <a href="https://ec.europa.eu/esco/portal/document/bg/6d66d96b-f2d9-405f-be49-15dbcc31f99c">https://ec.europa.eu/esco/portal/document/bg/6d66d96b-f2d9-405f-be49-15dbcc31f99c</a>	T032
<a href="http://www.isbe.net">www.isbe.net</a>	T032
Standard 1B) of Illinois Standards for Social/Emotional Learning	T033
Standard 1C) of Illinois Standards for Social/Emotional Learning	T034
Standard 3B) of Illinois Standards for Social/Emotional Learning	T035
Standards and Guidelines for Quality Assurance in the European Higher Education Area - ESG ( <a href="https://enqa.eu/index.php/home/esg/">https://enqa.eu/index.php/home/esg/</a> ) <a href="https://enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf">https://enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf</a>	T036
American School Counselor Standards (ASCA) Standards – ( <a href="http://static.pdesas.org/content/documents/ASCA_National_Standards_for_Students.pdf">http://static.pdesas.org/content/documents/ASCA_National_Standards_for_Students.pdf</a> )	T036
Career Development Standard A) of ASCA_National_Standards_for_Students	T037
Career Development Standards B) of ASCA_National_Standards_for_Students	T038
Career Development Standard C) of ASCA_National_Standards_for_Students.	T039
Personal/Social Development Standard B) of ASCA_National_Standards_for_Students	T040
<a href="http://www.nbea.org/newsite/curriculum/standards/">http://www.nbea.org/newsite/curriculum/standards/</a> )	T041
Career Development Standard #1, Self-Awareness) of National Business Education Standards	T042
Career Development Standard #4, Career Strategy) of National Business Education Standards, see Competence Matrix created by Vocational Education and Training in the Working World 4.0, <b>Intellectual Outputs</b> , Erasmus+K2	T043

**ARRANGEmyICTCareer Reference: T043 Addendum** created by Vocational Education and Training in the Working World 4.0, **Intellectual Outputs, Erasmus+K2**

Competence Matrix Teachers Vet 4.0				
	Digital Key Competences			
Core Working Fields for Teaching	1. Professional Competences 4.0	2. Media competences	3. Application Know-how	4. Basic ICT Know-how and Skills
<b>A.</b> To develop and implement annual teaching plan and to manage documents	1.1. To identify technological and organizational changes in the mechatronics and electronics in the systemic way for the training course and to prepare them didactically. 1.2. To evaluate the possibilities and risks of the digitalized work and business processes. 1.3. To restructure networked process chains in learning. 1.4. To train by applying content of embedded systems, including their operating systems. 1.5. To provide know-how on handling interactions with sensors, reading information and collecting of data. 1.6. To train on handling the processes of robotics (robot and "cobot"), including know-how to program and control production robots in the different technological processes. 1.7. To provide know how on the installation and exploitation of the Internet of Things and CPS.	2.1 To identify and assess digital key competences applied in the ICT media. 2.2 To identify the media competences applied in the work, business and social contexts. 2.3 To design and plan the installation of the media technologies in the school. 2.4 To organize cooperation of learners in the digital learning environment. 2.5 To organize knowledge management.	3.1. To install learning management systems. 3.2. To install specialized social media 3.3. To install professional software for learning. 3.4. To select and install the didactic instruments for cooperative learning. 3.5. To document the digital teaching plans for common (cooperative) usage. 3.6. To handle software for management.	4.1 To install professionally office software appliances. 4.2 To configure and set-up learning management systems. 4.3 To provide digital applications in the local area network.
<b>B.</b> To plan and design learning processes	1.1. To design the concept of digital process chain (4.0) in the teaching and learning process. 1.2. To select digitalized learning and teaching scenarios that facilitate problem oriented and self-organized learning. 1.3. To plan and execute interactive, virtual and individual learning phases. 1.4. To select interactive media for learning and training.	2.1. To select, install and evaluate the digital teaching and learning scenarios. 2.2. To check the used media for accessibility/openness, problem solving and requirement level. 2.3. To check on how the media facilitate development of decision making skills, abilities to cooperate and creativity.	3.1 To install the elements of digital learning scenarios and formats (Blended und Online-Learning).	4.1. To integrate audio and video data 4.2. To prepare video-tutorials 4.3. To prepare digitalized content. 4.4. To integrate the data from external and internal sources in the teaching. 4.5. To consider copyright protection issues.

<b>C.</b> To communicate, cooperate	1.1. To organize the interdisciplinary cooperation in the learning process. 1.2. To present the information and data for learners by using interactive media. 1.3. To communicate, collaborate and coordinate the learning process with external partners. 1.4. To ensure the safety of personal and corporate data used in the training and work processes.	2.1. To execute timely and operative communication with the internal (school) and external addressees regardless their location and time.	3.1. To apply the digital communication instruments for the regular and remote teaching. 3.2. To use electronic teaching diaries.	4.1. To handle inquiries and feedback from the digitalized instruments.
<b>D.</b> To analyze and evaluate learning process, achievements and success of learners	1.1. To check media usage for occupational and learning relevance. 1.2. To design cooperative online reflection processes. 1.3 To evaluate content, human and technical resources for media use.	2.1. To identify informally and non-formally acquired digital skills. 2.2. To analyze students' media literacy development. 2.3. To analyze and classify media technology in the course of education.	3.1. To plan and evaluate the formats of individual and team activities. 3.2. To select and install the online tools for diagnostics and assessment of performance at learning and work.	4.1. To collect, aggregate, analyze and evaluate data from learning processes (Learning Analytics). 4.2. To adjust the performance rating tools. 4.3. To apply privacy and data security requirements.

**ARRANGemyICTCareer Reference: T043 Addendum, Competence matrix for the working world 4.0 - mechatronics and electronics** created by Vocational Education and Training in the Working World 4.0, **Intellectual Outputs**, Erasmus+K2

COMPETENCE CHANGE AREAS	WORK PROCESSES FOR COMPETENCE DEVELOPMENT / COMPETENCES				
1. Installation and startup initiation of Cyberphysical Systems (CPS)	He/She is able to install standardized components of cyberphysical systems (CPS).  He/She is able to select, install and configure wired, optical and wireless transmission media to network link CPS.  He/She complies with legal and operational internal requirements for data protection and data security in dealing with CPS.	He/She is able to configure and parameterize components and systems using suitable software.  He/She uses ERP systems to record and document the system function via available system parameters.  He/She combines connects automation and information technology components horizontally and vertically.	He/She is able to integrate subsystems in order to adapt the function volume according to given specifications.  He/She is able to use ERP systems to adapt and document the production processes.  He/She is able to program new applications to connect multiple components or objects and to integrate them into the process chain.	He/She is able to integrate automated processes into an ERP system.	

2. Maintenance Cyberphysical Systems (CPS)	He/She is able to exchange standardized components of cyber physical systems.	<p>He/She is able to localize and eliminate disturbances with the help of digital assistance systems (remote control).</p> <p>He/She is able to carry out the maintenance of the CPS on the basis of prepared edited big data.</p>	<p>He/She is able to provide spare parts software- controlled “just in time”. by procurement of.</p> <p>He/She is able to filter and process relevant product information from media offerings (e.g., manufacturer portals) using search strategies.</p>	He/She is able to perform customized maintenance of machine and plant components based on continuous data collection processes.	He/She is able to re-trieve call up large amounts of data / big data of the production, to prepare edit and to evaluate them by suitable algorithms and to derive preventive maintenance measures. EQF 5-6
3. Operation monitoring Cyberphysical Systems (CPS)	<p>He/She is able to apply industry-specific production planning software products (ERP) in order to perform order processing in the production unit.</p> <p>He/she ensures data protection by applying existing security measures.</p> <p>He/she monitors measures</p>	<p>He/She is able to use the industry- specific software products of pro- duction planning software products (ERP) to monitor the production process.</p> <p>He/She is able to implement visual- ization software to monitor process data.</p> <p>He/She is able to identify and analyze sources of error in CPS systems.</p>	<p>He/She is able to use the industry-specific produc- tion planning software products (ERP) to opti- mize the production process at the workplace.</p> <p>He/She is able to opti- mize the energy efficien- cy of CPS systems.</p>		He/She is able to select relevant parameters for transfer to the ERP system so that pro- cesses can be moni- tored and optimized. EQF 5/6

	to secure the data by using existing backup systems.	He/She ensures the operation of a networked system by using autonomous or adaptive components and systems.			
4. Planning Cyberphysical Systems (CPS)	<p>He/She is able to prepare and exemplarily apply 3D drawings for rapid prototyping.</p> <p>He/She is able to use networked planning and product management systems by mobile devices.</p>	<p>He/She is able to use methods to model components of equipment (e.g. rapid prototyping).</p> <p>He/She is able to select and process customer and process data in ERP systems.</p>	<p>He/She is able to use computer simulation and virtual representations (e.g. VR, AR) of real CPS systems for planning.</p> <p>He/She considers legal and internal requirements for energy efficiency and environmental protection.</p>	He/She is able to implement and configure ERP systems.	<p>He/She is able to develop procedures for cooperation between production and logistics. EQF 5/6</p> <p>He/She is able to apply the increased occupational safety requirements in the development of interactive collaborative CPS systems (e.g. Cobots).</p>
5. Organization of	He/She is able to adapt the work process to changing	He/She is able to work together cooperate with the various produc-	He/She is able to adapt the work process to	He/She is able to optimize the efficien-	



work processes in connected process chains	production processes.	tion and business units within the process chain.	changing production processes.	cy of the production process.	
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## **ARRANGemyICTCareer Reference: T071**

### **Skills Self-Assessment Purpose**

This skills self-assessment is designed to help you review your own perception of your soft and technical project management skills, in context of your organizational. There are a variety of ways you can use this self-assessment to help you improve:

- f) It can help you define those skills you think would be of more value to your current position
- g) It can help sharpen focus on whether your current organization is supporting your skills gaps
- h) It can help project leaders offer a way for their team members to define areas of strength and weakness for opportunities for growth.

It is recommended that you take this skills test on a regular basis to measure improvement and identify new areas of growth.

### **Skills Self-Assessment**

Which set of skills do you use more in your role? [Choose one]

- 6. Technical skills (e.g. how to create projects within a software tool; calculating earned value)
- 7. Soft Skills (bringing issues to resolution; communicating with team members and stakeholders)
- 8. Both equally

How would you rate your level of capability with the following technical skills? A high level indicates you have high training or confidence in your abilities, whereas none indicates you have no skill or training in this area.

	None	Low	Average	Above Average	High
Scheduling					
Risk Management					
Estimating					
Task Management					
Budgeting					
Data Analysis					
Strategic Planning					

How would you rate your level of capability with the following soft skills? A high level indicates you have high training or confidence in your abilities, whereas none indicates you have no skill or training in this area.

	None	Low	Average	Above Average	High
Communication					
Problem Solving					
Critical Thinking					
Decision Making					
Time Management					
Team Work					

## **ARRANGEmyICTCareer Reference: T093**

### **Way To Do a Skills Gap Analysis**

Using Excel, or even pen and paper, this skills gap analysis method will give us actionable results to improve our Enterprise.

There is a hot debate at the macro level whether there really is a skills gap—a gap between the skills employers need and the ones employees have to offer—or not. Some argue there never was one. Others argue that it not only exists, but it's getting worse.

As an Instructor manager or corporate trainer, though, we don't care about the macro level. We care about our course. Maybe we need to fix a major skills gap immediately to compete or maybe we just want to learn how to prioritize our training, either way it pays to do a skills gap analysis.

We will explain what a skills gap analysis is, then show us how to do one ourselves. (using free, downloadable Excel template that adds a crucial step related to skill importance that will net us more actionable results than other methods.)

What is a skills gap analysis?

A skills gap analysis is a tool for determining the gaps between the skills our employees have today and the skills they need for our Enterprise to accomplish its goals moving forward. Doing a regular skills gap analysis can help our Enterprise in several ways:

- It helps us make the best use of our training budget. At a time when companies are spending more than \$1,200 per employee, per year on training, doing a skills gap analysis can tell us how we should prioritize that training spend to get the best results.
- It improves student's attention and worker retention and productivity efforts. According to a LinkedIn study, 94% of employees would stay at a company longer if it simply invested in helping them learn. A skills gap analysis can mark the beginning of that investment, while giving workers skills they need to perform better in their role.
- It prepares our Enterprises and Academia for major disruption.

Staying ahead of the major skills the Enterprise needs to have to survive—whether it's developing AI or analyzing data—will ensure we are not scrambling when it's too late and our competitors have already adjusted.

- It informs Enterprise long-term recruiting strategy. Whatever skills Enterprise can't develop internally, so Enterprise needs to hire externally or to debate with Academia about new EducationProgram. A skills gap analysis can help us to update those job descriptions and skills requirements, so the skills gap analysis brings the right people into the Enterprise.

A skills gap analysis can be scaled up or down as needed depending on available resources and needs. We can perform one on the whole Enterprise, a single department, an individual worker, a talent.

### **Skills gap analysis in 5 steps**

Our skills gap analysis method is similar to a lot of other methods out there, but with one critical difference that we believe offers more actionable results.

Though we're doing this in Microsoft Excel to automate some of the math, it's not required. You can do this entire process on pen and paper. For simplicity's sake, we're also acting as if we are performing this analysis on a whole team or department, rather than an Individual.

Step	Activities
1	<p><b>Identify the skills needs of the group we are analyzing</b></p> <p>The first step with any skills gap analysis is to meet with the stakeholders of the group we are analyzing-likely a department head or team lead-to figure out the skills that group needs to succeed. The skills we decide on can come from a number of sources. We could review job descriptions or the mission statement of the Enterprise. We could analyze industry trends or customer feedback. It doesn't matter if they're soft skills (e.g., emotional intelligence) or hard skills (e.g., AI programming).</p> <p>The important thing to keep in mind is that now is not the time to assess what skills this group does or does not have. It's just what's needed to thrive long-term. Once we 've landed on 5 to 10 skills we want to prioritize, we can move on to the next step.</p>
2	<p><b>Download MS Excel free skills gap analysis template</b></p> <p><i>T095_skills-gap-analysis-template.xlsx to be found in ARRANGE ICT file archive</i></p> <p>The rest of the steps that follow will leverage this Excel template.</p>

3

### Rate the importance of each skill we identified

While every skills gap analysis method out there factors in employee competency regarding different skills, none of them also factor the priority of each skill. What does it matter if an employee lacks a skill if it's a relatively low priority for the department? Conversely, which gap is really a big deal because that skill is paramount to the success of the company? That's where this step plays a key role.

When we open the Excel file, we will see this in the first tab:

**Instructions:** Under "Skill Name" below, list up to 10 skills that you think are important to the specific team or department you're performing a skills gap analysis on. Then, under 'Skill Importance,' rate each skill on a scale of 1 to 5, with 5 being the most important skill for this team or department and 1 being the least important. When you're done, proceed to the tab for "Step 2 - Skill Ratings."

Skill Name	Skill Importance (1 - 5)
[Skill #1]	
[Skill #2]	
[Skill #3]	
[Skill #4]	
[Skill #5]	
[Skill #6]	
[Skill #7]	
[Skill #8]	
[Skill #9]	
[Skill #10]	

Rating skill importance in a skills gap analysis

Take the skills we identified in step one and add them under "Skill Name:" Then, under "Skill Importance," rate each skill on a scale of 1 to 5, with 5 being the most important skill for the team or department, and 1 being the least important.

Think carefully and rank the skills on paper first if we have to. If we end up with a bunch of 4s and 5s, we didn't do this step right. Ideally, we should end up with importance ratings across the entire scale. Our final result should look something like this:



**Instructions:** Under "Skill Name" below, list up to 10 skills that you think are important to the specific team or department you're performing a skills gap analysis on. Then, under 'Skill Importance,' rate each skill on a scale of 1 to 5, with 5 being the most important skill for this team or department and 1 being the least important. When you're done, proceed to the tab for "Step 2 - Skill Ratings."

Skill Name	Skill Importance (1 - 5)
Data analysis	3
Emotional intelligence	5
Creativity	2
Writing	1
Digital literacy	4
Leadership	5
HTML	2
Communication	4
Video production	3
SQL	1

A finished example of rating skill importance in a skills gap analysis. Once we are done, move on to the second tab in the spreadsheet: "Skill Ratings:"



4

### Rate the competency of each employee for each skill

This step is the bread and butter of our analysis, where we'll assess the competency of each current employee for the skills we've identified.

Where it says "[Team/Department Name]," add the team or department we are analyzing, then add the employees on that team or department below-one for each row. We'll notice the skills we entered in the last step have already been populated in separate columns on this tab. For each skill, assess each worker on a scale of 1 to 5: 1 meaning they've already mastered that skill, and 5 meaning they don't have that skill at all. That may sound backward, but again, we're trying to measure a gap. The higher the number, the more severe the gap.

We can come up with competency ratings using a number of different sources:

- Performance reviews
- Skills assessments and tests
- Surveys and interviews

Whatever methods we use, the final result should look something like this:

Marketing	Data analysis	Emotional intelligence	Creativity	Writing	Digital literacy	Leadership	HTML	Communication	Video production	SQL
Iron Man	1	3	4	3	4	1	2	5	3	2
Captain America	4	2	2	1	5	3	2	2	4	1
Black Widow	2	2	1	4	4	3	5	2	5	4
Hawkeye	3	3	2	1	5	5	2	5	1	3
The Hulk	2	2	2	5	4	1	3	1	1	4
Spider-Man	3	1	1	4	3	5	2	5	3	2
Ant-Man	4	1	4	2	4	3	1	3	2	5
Vision	5	3	1	3	3	4	4	1	4	3
Captain Marvel	3	3	2	5	5	4	1	4	1	4
Black Panther	3	3	2	1	5	5	3	5	4	5
Rocket Raccoon	2	4	5	5	1	5	2	2	2	4
Star-Lord	5	2	4	1	4	2	4	4	3	5
Thor	1	3	5	4	5	2	1	1	2	2
Loki	3	5	5	2	4	4	5	1	5	2
Doctor Strange	1	3	3	5	3	1	4	3	5	3
Scarlet Witch	5	1	2	1	2	3	4	2	1	4
The Falcon	2	2	1	3	2	5	2	4	1	2
War Machine	4	4	5	3	3	2	5	5	4	5
Drax	3	4	1	2	4	2	1	5	5	1
Groot	5	2	4	1	5	3	1	4	5	2

A finished example of rating employee skill competency in a skills gap analysis

Now it's time to see where our gaps are. Head to the last tab in the spreadsheet: "Results:"

5

## Analyze our results

"Results" tab will look something like this:

Marketing	Data analysis	Emotional intelligence	Creativity	Writing	Digital literacy	Leadership	HTML	Communication	Video production	SOL	GAP TOTAL
Iron Man	3	15	8	3	16	5	4	20	9	2	85
Captain America	12	10	4	1	20	15	4	8	12	1	87
Black Widow	6	10	2	4	16	15	10	8	15	4	90
Hawkeye	9	15	4	1	20	25	4	20	3	3	104
The Hulk	6	10	4	5	16	5	6	4	3	4	63
Spider-Man	9	5	2	4	12	25	4	20	9	2	92
Ant-Man	12	5	8	2	16	15	2	12	6	5	83
Black Panther	15	15	2	3	12	20	8	4	12	3	94
Captain Marvel	9	15	4	5	20	20	2	16	3	4	98
Vision	9	15	4	1	20	25	6	20	12	5	117
Rocket Raccoon	6	20	10	5	4	25	4	8	6	4	92
Star-Lord	15	10	8	1	16	10	8	16	9	5	98
Thor	3	15	10	4	20	10	2	4	6	2	76
Loki	9	25	10	2	16	20	10	4	15	2	113
Doctor Strange	3	15	6	5	12	5	8	12	15	3	84
Scarlet Witch	15	5	4	1	8	15	8	8	3	4	71
The Falcon	6	10	2	3	8	25	4	16	3	2	79
War Machine	12	20	10	3	12	10	10	20	12	5	114
Drax	9	20	2	2	16	10	2	20	15	1	97
Groot	15	10	8	1	20	15	2	16	15	2	104
GAP TOTAL	183	265	112	56	300	315	108	256	183	63	

An example of the results from a skills gap analysis




The numbers in each cell where an employee and a skill intersect are generated by multiplying the skill importance in the first tab by the skill competency rating in the second tab. The bigger the number, the bigger the skill gap. Or, for visual folks: red is bad, green is good.



The "Gap Total" row at the bottom sums up the skills gap for our entire team. In the example above, we can see leadership (315) and digital literacy (300) represent the biggest skills gaps. Note that emotional intelligence was rated as more important than digital literacy earlier (5 vs. 4), but the average competency rating for digital literacy on this team is much lower than that for emotional intelligence, which is why digital literacy represents a larger gap.

The "Gap Total" column, on the other hand, sums up the gaps for each employee. In the example above, we can see Vision (117), War Machine (114), and Loki (113) need the most work.

## ARRANGEmyICTCareer Reference: T131

### Digital competences - Self-assessment grid

	Basic User	Independent user	Proficient user
 <b>Information processing</b>	<p>I can look for information online using a search engine. I know not all online information is reliable.</p> <p>I can save or store files or content (e.g. text, pictures, music, videos, web pages) and retrieve them once saved or stored.</p>	<p>I can use different search engines to find information. I use some filters when searching (e.g. searching only images, videos, maps).</p> <p>I compare different sources to assess the reliability of the information I find.</p> <p>I classify the information in a methodical way using files and folders to locate these easier. I do backups of information or files I have stored.</p>	<p>I can use advanced search strategies (e.g. using search operators) to find reliable information on the internet. I can use web feeds (like RSS) to be updated with content I am interested in.</p> <p>I can assess the validity and credibility of information using a range of criteria. I am aware of new advances in information search, storage and retrieval.</p> <p>I can save information found on the internet in different formats. I can use cloud information storage services.</p>
 <b>Communi- cation</b>	<p>I can communicate with others using mobile phone, Voice over IP (e.g. Skype) e-mail or chat – using basic features (e.g. voice messaging, SMS, send and receive e-mails, text exchange).</p> <p>I can share files and content using simple tools.</p> <p>I know I can use digital technologies to interact with services (as governments, banks, hospitals).</p> <p>I am aware of social networking sites and online collaboration tools.</p> <p>I am aware that when using digital tools, certain communication rules apply (e.g. when commenting, sharing personal information).</p>	<p>I can use advanced features of several communication tools (e.g. using Voice over IP and sharing files).</p> <p>I can use collaboration tools and contribute to e.g. shared documents/files someone else has created.</p> <p>I can use some features of online services (e.g. public services, e-banking, online shopping).</p> <p>I pass on or share knowledge with others online (e.g. through social networking tools or in online communities).</p> <p>I am aware of and use the rules of online communication ("netiquette").</p>	<p>I actively use a wide range of communication tools (e-mail, chat, SMS, instant messaging, blogs, micro-blogs, social networks) for online communication.</p> <p>I can create and manage content with collaboration tools (e.g. electronic calendars, project management systems, online proofing, online spreadsheets).</p> <p>I actively participate in online spaces and use several online services (e.g. public services, e-banking, online shopping).</p> <p>I can use advanced features of communication tools (e.g. video conferencing, data sharing, application sharing).</p>
 <b>Content creation</b>	<p>I can produce simple digital content (e.g. text, tables, images, audio files) in at least one format using digital tools.</p> <p>I can make basic editing to content produced by others. I know that content can be covered by copyright.</p> <p>I can apply and modify simple functions and settings of software and applications that I use (e.g. change default settings).</p>	<p>I can produce complex digital content in different formats (e.g. text, tables, images, audio files). I can use tools/editors for creating web page or blog using templates (e.g. WordPress).</p> <p>I can apply basic formatting (e.g. insert footnotes, charts, tables) to the content I or others have produced.</p> <p>I know how to reference and reuse content covered by copyright. I know the basics of one programming language.</p>	<p>I can produce or modify complex, multimedia content in different formats, using a variety of digital platforms, tools and environments. I can create a website using a programming language.</p> <p>I can use advanced formatting functions of different tools (e.g. mail merge, merging documents of different formats, using advanced formulas, macros).</p> <p>I know how to apply licences and copyrights.</p> <p>I can use several programming languages. I know how to design, create and modify databases with a computer tool.</p>

 Safety	<p>I can take basic steps to protect my devices (e.g. using anti-viruses and passwords). I know that not all online information is reliable.</p> <p>I am aware that my credentials (username and password) can be stolen. I know I should not reveal private information online.</p> <p>I know that using digital technology too extensively can affect my health. I take basic measures to save energy.</p>	<p>I have installed security programmes on the device(s) that I use to access the Internet (e.g. antivirus, firewall).</p> <p>I run these programmes on a regular basis and I update them regularly.</p> <p>I use different passwords to access equipment, devices and digital services and I modify them on a periodic basis.</p> <p>I can identify the websites or e-mail messages which might be used to scam. I can identify a phishing e-mail.</p> <p>I can shape my online digital identity and keep track of my digital footprint.</p> <p>I understand the health risks associated with the use of digital technology (e.g. ergonomics, risk of addiction).</p> <p>I understand the positive and negative impact of technology on the environment.</p>	<p>I frequently check the security configuration and systems of my devices and/or of the applications I use.</p> <p>I know how to react if my computer is infected by a virus.</p> <p>I can configure or modify the firewall and security settings of my digital devices.</p> <p>I know how to encrypt e-mails or files. I can apply filters to spam e-mails.</p> <p>To avoid health problems (physical and psychological), I make reasonable use of information and communication technology.</p> <p>I have an informed stance on the impact of digital technologies on everyday life, online consumption, and the environment.</p>
 Problem solving	<p>I can find support and assistance when a technical problem occurs or when using a new device, program or application.</p> <p>I know how to solve some routine problems (e.g. close program, re-start computer, re-install/update program, check internet connection).</p> <p>I know that digital tools can help me in solving problems. I am also aware that they have their limitations.</p> <p>When confronted with a technological or non-technological problem, I can use the digital tools I know to solve it.</p> <p>I am aware that I need to update my digital skills regularly.</p>	<p>I can solve most of the more frequent problems that arise when using digital technologies.</p> <p>I can use digital technologies to solve (non-technical) problems. I can select a digital tool that suits my needs and assess its effectiveness.</p> <p>I can solve technological problems by exploring the settings and options of programmes or tools.</p> <p>I regularly update my digital skills. I am aware of my limits and try to fill my gaps.</p>	<p>I can solve almost all problems that arise when using digital technology.</p> <p>I can choose the right tool, device, application, software or service to solve (non-technical) problems.</p> <p>I am aware of new technological developments. I understand how new tools work.</p> <p>I frequently update my digital skills.</p>

**ARRANGEmyICTCareer Reference: T139**

## Smart Action Plan Template

**S-** Be **Specific** about what you want to achieve, do not be ambiguous, communicate clearly.

**M-** Ensure your result is **Measurable**. Have a clearly defined outcome and ensure this is measureable (KPIs).

**A-** Make sure it is **Appropriate**. Is it an **Achievable** outcome?

**R-** Check that its **Realistic**, it must be possible taking account of time, ability and finances.

**T-** Make sure it is **Time** restricted. Set yourself an achievable time frame, set deadlines and milestones to check your progress.

Action	Specific	Measurable	Appropriate	Realistic	Time	Staff Responsible	Status
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							

**ARRANGEmyICTCareer Reference: Txxx**  
**To be filled**

## Appendix A - Comparing Digital Skills Frameworks 1 of 4

Model	Date	Aim	Core demographic	Sample of core knowledge identified	Sample of ICT-specific knowledge identified	Dimensions identified to address skills gap	Levels identified
General Digital Skills Frameworks							
<a href="#">"DigComp 2.0: The Digital Competence framework for Citizens," European Commission</a>	2014	General tool for improving digital literacy for EU citizens	General: EU citizens	Communication; content creation; safety; problem-solving	Information-processing	5 competence areas	--
<a href="#">"Digital Skills and Business School Curriculum," Cukier, Smarz and Grant</a>	2017	General pedagogical tool for business school curriculum mapping and development	K-12 grade school students; students/occupational training level; general audience (self-study/ social interaction)	Start up and build SMEs; enhance personal opportunities and quality of life	Develop innovative ICT infrastructure; capacity to innovate using digital technology	3 levels x 3 age groups = 9 dimensions	3: Basic literacy; business/technology skills/deep technical and content creation
<a href="#">"Digital Skills Toolkit," International Telecommunications Union</a>	2018	To address the digital skills gap globally and support youth employment	General audience; youth	Word processing; using keyboards and touch screens	AI; cybersecurity; IoT	3, reflecting the levels	3: Basic; intermediate; advanced
<a href="#">"New Vision for Education: Unlocking the Potential for</a>	2015	General pedagogical tool	General audience	Numeracy; literacy; financial	ICT literacy	3: Foundational literacies; competencies; character qualities	--



## Appendix A - Comparing Digital Skills Frameworks 2 of 4

technology," World Economic Forum/ Boston Consulting Group				literacy; communication			
"Bryn Mawr College Digital Competencies Framework," Bryn Mar College	2016	General pedagogical tool	General audience	Digital survival skills; digital communication	Data analysis and presentation; data management and preservation	5 competencies	--
"JRC Conceptual Model," Pete Cranston/Euforic Services/ITAD	2011	General tool for improving digital literacy for citizens	General audience	Problem- solving; collaboration; creativity and expression	ICT literacy; information management; application skills for networked visual and dynamic media	4: unclear	--
"Brookfield Skills Map," Do and Huynh, Brookfield Institute	2017	General tool to address the digital skills gap and support workers in the digital era	Labour force	Problem- solving; flexibility; entrepreneurial thinking; collaboration	Computational thinking	3: technical skills; cognitive abilities; critical thinking	3: Baseline; workforce; professional
"BTM Learning Outcomes," BTM Forum and ITAC	2009	General tool to address the digital skills gap and support workers in the digital era	Labour force	Project management; teamwork; organizational learning; decision-making	Data- warehousing; digital-marketing; packaged software	3: foundations; roles and skills; outcomes Sub-divided into 7: 1) integrative; 2) personal and interpersonal; 3) business; 4) technology; 5) technology in business, 6) innovation; 7) processes, projects and change	--

## Appendix A - Comparing Digital Skills Frameworks 3 of 4

<a href="#">"All Aboard: Digital Skills in Higher Education", Government of Ireland</a>	2017	Pedagogical tool for post-secondary educators	Students; teachers	Presentation skills; project management; producing content; time management	Operating systems; coding; app development	6: Tools and technologies; teach and learn; find and use; communicate and collaborate; create and innovate; identity and wellbeing	--
<a href="#">"New Foundational Skills of the Digital Economy: Developing the Professionals of the Future," Burning Glass Technologies/ BHEF</a>	2018	Pedagogical tool and general use tool to address the digital skills gap and support workers in the digital era	Students; teachers; working professionals in the labour force	Analytical skills; critical thinking; project management	Digital design; digital security and privacy; analyzing data	3: Human skills; digital building blocks; business enablers	--
<b>ICT Specific Skills Frameworks</b>							
<a href="#">"Business Technology Management (BTM) Body of Knowledge (BOK) Framework," ITAC and BTM Forum</a>	2017	Tool for stakeholders working in, training and hiring business technology professionals	HR professionals, employers, BTM professionals	People and knowledge management; project management; services management; business analysis	System integration; software; model-driven engineering	4: Information technology (it); information systems (is); IS-IT management; business technology management	--
<a href="#">"European Framework for ICT Professionals/ e-Competence Framework,"</a>	2018		HR professionals; employers; ICT professionals	Needs identification; project and portfolio management; relationship management	Application design; technology trend monitoring; systems engineering	3: Areas; competencies; e-levels	5: e-1 to e-5
<a href="#">"ICT professional Core Body of Knowledge</a>	2015	Tool for ICT professionals; employers and	HR professionals; employers;	1) ethics, 2) professional expectations,	Hardware and software fundamentals;	4: Problem solving, abstraction and design; ethics and professionalism;	--

## Appendix A - Comparing Digital Skills Frameworks 4 of 4

<a href="#">(CBOK), " Australian Computer Society</a>		other stakeholders in the labour market	ICT professionals	[3) teamwork concepts and issues, 4) interpersonal communication 5) societal issues/legal issues/privacy, and 6) understanding the ICT profession	data and information management; networking; technology building	teamwork concepts and issues; interpersonal communication	
<a href="#">Skills Future SG (Singapore)</a>	current	Skills mapping to strengthen adult training infrastructure	Aspiring ICT professionals	6 levels of proficiency mapped for numerous skills	Data, infrastructure, professional services, security, sales and marketing, software and apps, support	6 levels * 33 roles	Levels 1 to 6
<a href="#">O*NET</a>	Current	Classification of occupation-based skills	General	Comprehensive database	Communication; teamwork; transdisciplinary thinking; sense-making; problem-solving; leadership	7 dimensions: Data, infrastructure, professional services, security, sales and marketing, software and applications, support	Multiple
<a href="#">WEF</a>	2018	Classification of skills used, based on O*NET content model	General stakeholders	Numerous competencies bundled by broader areas — e.g. emotional intelligence	Technology selection, monitoring and control	26 bundles of competencies	--

## Appendix B - Digital Training Models 1 of 3

Model Type	Stakeholders offering this training	Typical focus of training	Target demographic	Method of delivery	Examples of Innovative Approaches
Elementary and high school new curriculums focused of digital skills; extracurricular curriculums	Public and private primary and secondary schools	Coding; gaming; problem-solving using digital tools; math and digital tools	Children and youth	Embedded in elementary and high school curriculum  After-school programming and tutoring, in person and online	<a href="#">Sylvan Learning..Coding for Kids</a>  <a href="#">Techy School, Coding and Programming for Kids Grade 6+ online</a>
University degree or college diploma/ formal undergraduate or graduate training	Universities, colleges	Computer science, btm, engineering, information science, digital media degree programs	Youth, undergraduates	Paid Undergraduate 3-4 years Graduate 1-3  In-person and online full time and part time	<a href="#">Queen's MBA in Artificial Intelligence</a>  <a href="#">George Brown Bachelor of Digital Experience Design</a>  <a href="#">MIT, Bachelor of Science in Computer Science, Economics, and Data Science</a>
Work integrated learning (WIL)	Universities, colleges, public organizations, not-for-profits	Diverse	Youth, mid-career working professionals	Can be part of formal undergraduate training or standalone  Sponsored or government-funded work-integrated learning programs	<a href="#">Diversity Institute.. Ryerson University. AdaPT</a>  <a href="#">NPower Canada</a> <a href="#">Palette</a> <a href="#">TalentX</a> <a href="#">Bridge</a>
Continuing education/ formal post-graduate certification	Universities colleges, innovation centres,	Analytics, Digital Media, Intensive	Working professionals	Continuing education courses in skills training; fee per user	<a href="#">George Brown College. Information and</a>

## Appendix B - Digital Training Models 2 of 3

	professional development programs	Coding, Technology Certifications			<a href="#">Communications Technology program</a>  <a href="#">British Columbia Institute of Technology, Web Technologies</a>  <a href="#">Harvard, IT Academy</a>
Bridging programs	Public, not-for-profit	Diverse	Internationally trained individuals (ITI)  Professionals bridging from one field to another	Online, in person	<a href="#">Humber College, Bridging Programs, ex. IT Infrastructure</a>  <a href="#">Calgary Catholic Immigration Society, Information and Technology Bridging Program</a>
Massive open online courses (MOOCs)	Public, private, and not for profit	Diverse	Typically those with existing credentials	MOOCs could be free or fee-based  Online multimedia including video and text. Typically, non credit, no grades and no/low costs for the courses. Certification often is for a fee.	<a href="#">LinkedIn Learning</a> <a href="#">Lynda.com</a> <a href="#">Khan Academy</a> <a href="#">edX</a> <a href="#">Coursera</a> <a href="#">FutureLearn</a> <a href="#">Friday Institute, MOOC-Ed</a> <a href="#">EMMA MOOC Aggregator</a> <a href="#">ALISON</a>
Upskilling or training programs	Employers, public and not for profit	Intensive training for coding, analytics, UX etc.	Mainly working professionals  Current employees,	Firms providing individuals and corporations with skills courses; fee-based; upskilling and corporate training mainly  Delivered in-person and online	<a href="#">Brainstation</a> <a href="#">Bitmaker GA</a> <a href="#">Canada Learning Code</a> <a href="#">Red Academy</a> <a href="#">Hacker U</a>

## Appendix B - Digital Training Models 3 of 3

			interns, candidates	<p>Both nonprofits and for-profit companies are involved in training potential employees in the ICT sector</p> <p>Intensive programs (often online) that teach advanced computer skills, e.g. Coding schools/ coding camps</p>	<a href="#">Lighthouse Labs</a> <a href="#">Udacity</a> <a href="#">Codecademy</a> <a href="#">Galvanize</a>  <a href="#">Government of Ontario, Coding in Elementary: A Professional Learning Resource for Ontario Educators</a>
Programs with specific demographic focus	Varied	Diverse	Women, girls, immigrants, other under-represented groups	Online and in-person courses targeted at underrepresented groups in the ICT sector; namely women and girls	<a href="#">Girls who Code</a> <a href="#">Girl Develop It</a> <a href="#">Learn to Code with Me</a>  <a href="#">Bridge, Upskilling and supporting women, agender, and non-binary professionals</a>



## Appendix C - Assessment Tools 1of1

Test for Skills and Competencies	Assessment focus	Method	Use
<b>Self-assessment tests</b>			
<a href="#">PIAAC</a>	Measures key cognitive and workplace skills	Home interviews, computer survey	Understand how education and training systems can nurture skills
<a href="#">OECD ESO (Education Skills Online)</a>	Literacy, numeracy, problem-solving, use of tech	Online test	Benchmarks test-takers against global demographic
<a href="#">Lumina Spark</a>	Psychometric	Online questionnaire	Self-knowledge, fit within work teams
<b>Standardized tests to measure essential skills</b>			
<a href="#">ESDC Essential Skills Indicator</a>	Numeracy, document use, reading,	Online pre- and post-tests up to 3 levels	Individual skill assessment, identify skill and improvement levels
<a href="#">IOWES</a>	General, sector, domain-specific, web-based	Paper-based and online	Employers assess workers' skills Employees, students and job-seekers identify and develop skills Trainers develop strategies
<a href="#">ESKARGO Initial Skills Assessment</a>	Skills, Knowledge and Attitudes		Adult and continuing ed practitioners
<a href="#">Canadian Adult Reading Assessment (CARA)</a>	Reading patterns	Print	Diagnostic tool for adult literacy education
<a href="#">CABS: Common Assessment of Basic Skills</a>	Reading, writing, numeracy, technology (basic computer skills)	Online	Adult learners and career practitioners
<a href="#">The Essential Skills Group</a>	Three online assessments (reading, document use, numeracy) for numerous occupations	Online Tests	Occupational fit
<b>Tests to Measure Specific Tools or Techniques</b>			
<a href="#">Pega CSA Exam</a>	Knowledge of Pegasystems platform	Online	Used by Pegasystems to grant certification
<a href="#">Salesforce</a>	Salesforce platform	Online through Pearson Vue	Certification
<a href="#">Criteria Pre-employment testing</a>	Skills tests on MS Office programs, basic computer literacy, typing, etc.	Web-based	Employers for screening applicants
<a href="#">TOSA Digital Solutions</a>	Adobe Creative Suite, OS skills	Web-based platform	Assessment tests for HR, certification tests for individuals