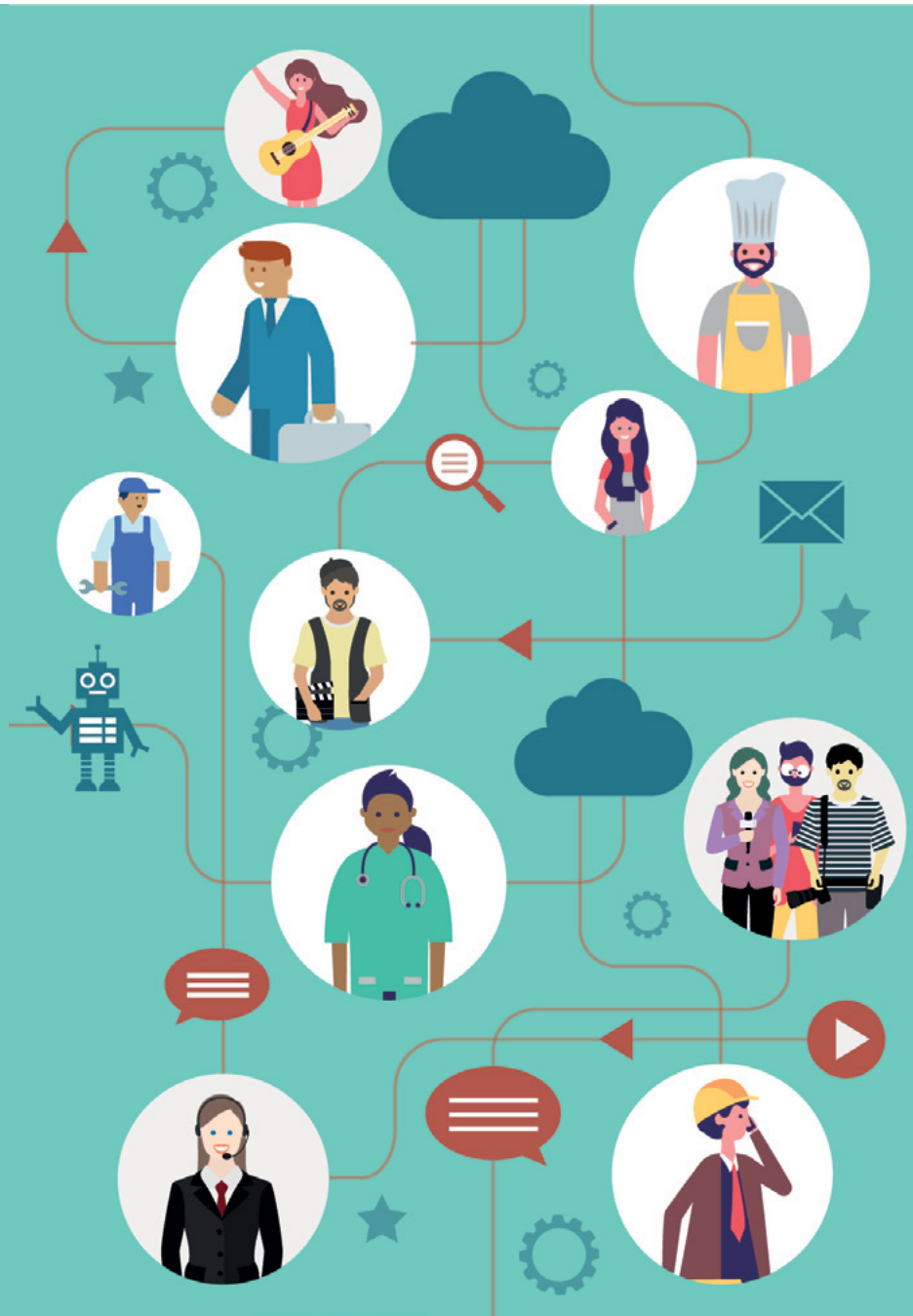

European Commission

DigComp at Work

The EU's digital competence framework in action on the labour market: a selection of case studies

Joint Research Centre

EUR 30166 EN

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DigComp at Work – The EU's digital competence framework in action on the labour market: a selection of case studies

This report and its Companion Implementation Guide (published separately) support stakeholders in the implementation of the European Digital Competence Frame work (DigComp) in contexts of employability and employment through the analysis and sharing of 9 existing inspiring practices and related resources of DigComp implementations. The list of examples provided in the Report´s Annex is not exhaustive and aims to illustrate the wide range of DigComp implementation practices.

Stefano Kluzer
Clara Centeno
William O´Keeffe

DigComp at Work

The EU's digital competence framework in action on the labour market: a selection of case studies

Joint
Research
Centre

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WELCOME MESSAGE

These two reports, *DigComp at Work: The EU's digital competence framework in action on the labour market*, and its *Implementation Guide* with practical guidance for labour market intermediaries on the use of DigComp are a new chapter in the success story of DigComp.

DigComp was first published in 2013 and since then has been used in national and international policy-making and in the design and delivery of digital skills development across the EU.

The story of DigComp is a story of commitment by stakeholders. DigComp stakeholders have translated, adapted, interpreted and applied DigComp in a variety of inspiring ways. DigComp stakeholders have also become ambassadors for co-operation on digital skills in Europe through working together in innovative projects and communities of practice.

These reports highlight the important use of DigComp by labour market stakeholders. It is a given now that digital skills are essential for life and work and are the foundation for employability and accessing information and support throughout our careers.

Support for managing the digitals transitions are at the heart of the European Skills Agenda adopted by the European Commission on the 1st of July 2020. DigComp has and will play a role in supporting the work of countries, companies and social partners to support the development of digital competences. The case studies showcase practical examples of the development of the digital competences, and the Implementation guide offers specific guidelines, examples and useful resources for the use of DigComp.

Our hope is that they serve as a call to action for greater uptake of DigComp and delivering on the goals of the European Skills Agenda.

I wish to give special thanks to those organisations: The Associazione Emiliano Romagnola di Centri Autonomi di Formazione Professionale and Ervet (Italy), Anpal Servizi (Italy), Ikanos project, Basque Government and Ibermática (Spain), ECCC Foundation (Poland), Expertise France (France) and Lai-momo (Italy), Hellenic Open University – DAISSy research group (Greece), Smartive (Italy), Tecnalia (Spain), Adecco, Mylia and Advancing Humanity srl (Italy), that gave such rich and inspiring information on their case studies. Thanks also to the team in the Commission's Joint Research Centre for their work in creating this report as well as their ongoing work on the implementation and development of DigComp.

Alison Crabb

Head of Unit, Skills and Qualifications
DG Employment, Social Affairs and Inclusion
European Commission

1. READER'S GUIDE

Key skills trends in employability context

Digital skills have become crucial for employability. Not only considering its role as a transversal skill to develop employability, but also because about 85% of all EU jobs need at least basic digital skill level.

The most recent available statistics collecting digital skills in Europe for the year 2017 show, however, that 43% of the EU population had an insufficient level of digital skills (no skills or low level). Furthermore, for the same year, 10% of the EU labour force had no digital skills, mostly because they did not use the internet, and 35% did not have at least basic digital skills, which are now required in most jobs.

The pace of change is accelerating due to the digital transformation bringing robotisation and cobotisation of an increasing number of tasks. This is confirmed by recent Eurostat data that shows that the job tasks of 16% of employed internet users in the EU had changed due to new software or computerised equipment in the twelve months prior to the survey, 29% had to learn how to use new software or equipment for their job. At the same time, almost half (47%) of employed internet users in the EU assessed their skills relating to the use of computers, software or applications at work as adequate for their duties, while 9% admitted that they needed further training.

Beyond digital skills, the set of skills required by the labour market is evolving. The first results from CEDEFOP initial research (March 2019) unveil the 10 skills requested in job vacancies: be adaptive to change, work well in team, use office software, assist customers, use a computer, solve problems, communicate well, be creative, be able to prioritise, manage projects.

Download DigComp into Action

Download EntreComp into Action

DigComp and EntreComp, European Key Competence Frameworks

To support the development of digital competences, the EC published the Digital Competence Framework for Citizens, also known as **DigComp**, which defines what it takes to be digitally competent. It offers a tool to improve citizens' digital competence. First published in 2013, DigComp has become a reference for the development and strategic planning of digital competence initiatives both at European and Member State level. The DigComp Framework has 5 dimensions:

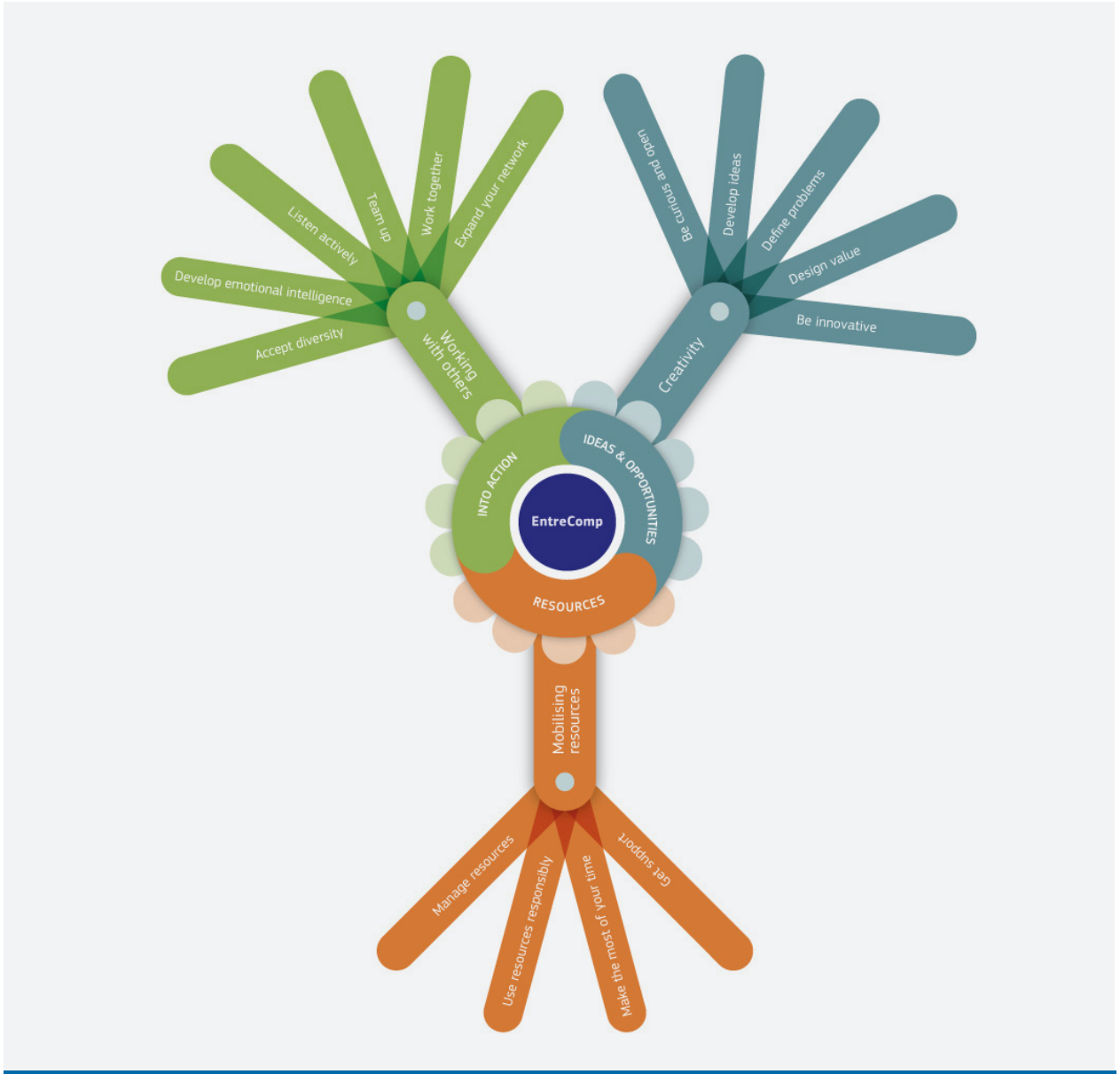
1. Competence areas (5) identified to be part of digital competence (see **F.1**);
2. Competence descriptors and titles (21) that are pertinent to each area (see **F.1**);
3. Proficiency levels for each competence;
4. Knowledge, skills and attitudes applicable to each competence, and
5. Examples of use, on the applicability of the competence to different purposes.

F.1 DIGCOMP COMPETENCE AREAS AND COMPETENCES

EntreComp, the European Entrepreneurship Competence

Framework launched in 2016, is a comprehensive, flexible and multi-purpose reference framework designed to help understand what is meant by entrepreneurship as a key competence for lifelong learning. It is intended to support and inspire actions to improve the entrepreneurial capacity of European citizens and organisations. EntreComp creates a shared understanding of the knowledge, skills and attitudes that make up what it means to be entrepreneurial – discovering and acting upon opportunities and ideas, and transforming them into social, cultural, or financial value or others. It is made up of 3 competence areas : 'Ideas and opportunities', 'Resources' and 'Into action'. Each area includes 5 competences, which, together, are the building blocks of entrepreneurship as a competence. The framework develops the 15 competences along an 8-level progression model (see **F.2**). Also, it provides a comprehensive list of 442 learning outcomes, which offers inspiration and insight for those designing interventions from different educational contexts and domains

of application.The EC has also produced DigComp into Action and EntreComp into Action guides for use by stakeholders in different contexts.



F.2 DIGCOMP COMPETENCE AREAS AND COMPETENCES

Research context and objectives

While DigComp offers a key starting point for understanding and developing digital competences, its use in different settings needs to be explored and strengthened so that the value of using the tool within larger processes around identifying skills needs and responses can be seen. A key case is for employees and job-seekers, who may not have experience or confidence with their digital skills, while at the same time, the nature of their jobs, the sectors they work in and their lives are increasingly influenced by digitalisation. Targeted, relevant systems and responses are needed to offer digital skills development to individuals.

To address these challenges, this publication describes the use of DigComp by Labour Market Intermediaries (LMIs) which are working towards the development of digital skills of unemployed, jobseekers, employees and entrepreneurs(-to-be) with the aim of increasing their employability (both in the public and private sectors).

Methodology

Labour Market Intermediaries (LMI) are understood as those actors working towards the development of digital skills of unemployed, jobseekers, employees and entrepreneurs(-to-be) with the aim of increasing their employability.

A systematic **literature review** was done to characterise LMIs that provide digital skilling services, and to identify the specific functions that they carry out along the employability path of the people they serve.

Then a **case analysis** was carried out with the aim to learn from the experience of those actors currently providing digital skilling services using DigComp. The research produced an initial inventory of 27 existing relevant cases, from which 9 cases were selected. The cases selected for further analysis, with sufficient maturity level, sought to ensure diversity in terms of LMI actors, types of services provided and target groups addressed across the employability path, multi-stakeholder cooperation models, and geographic diversity. Findings from a **consultation of 23 additional organisations** interested in applying, both DigComp and EntreComp frameworks, was also incorporated.

Finally, a **cross-case analysis** was performed to provide: a) a view of actual and potential uses of DigComp; b) an understanding of practical approaches to implement DigComp including steps for personalisation, modification or extension of the framework, and related complementary implementation supporting tools; and, c) an analysis of multi-stakeholder cooperation models, enabling factors, drivers, conditions and key success factors for implementing DigComp in the employability context.

2. MAPPING DIGCOMP USE IN THE LABOUR MARKET

C1 **A** Pane e Internet
B DCDS

C2 ProDigeo

C3 Ikanos

C4 ECCC DigComp certification

C5 Compass

C6 Mu.SA

C7 SmartiveMap

C8 **A** BAIT
B Pathways4Employ

C9 Adecco's Competences Dictionary

- NOT PARTICIPATING
- PARTICIPATING
- PARTICIPATING AND LEADING

F.3 COUNTRIES INVOLVED IN DIGCOMP CASES INCLUDED IN THE STUDY

2.1 ABOUT THE DIGCOMP CASES ANALYSED

The aim of the case analysis was to learn from the experience of those actors currently providing digital skilling services who are using DigComp. In particular, the research produced an initial inventory of 27 existing relevant cases, from which 9 cases were analysed.

DigComp cases included in the analysis are listed in **T.1**. The in-depth analysis of the 9 Labour Market Intermediaries (LMIs) applying DigComp is presented in **T.4**.

Additional findings from consultation with further 25 organisations was also incorporated in the analysis. These represent a wide range of actors applying, or interested into applying, both DigComp and EntreComp frameworks: University College Leuven-Limburg (BE), Valnalon (ES), Mindworks (GE), South East European Centre for European Learning (HR), Virke (NO), Cardiff Metropolitan University (UK), Materahub / Break in the Desk (IT, UK, FI, HU, ES, FR), Simply Do Ideas (UK), Talous ja nuoret TAT (FI), European Centre for Women and Technology (EU), Queensland innovation & entrepreneurial ecosystem (AUS), Kemmy Business School, University of Limerick (IE), State University of Applied Sciences (PL), Tomorrow´s Land, Regenerus (UK), Advice Skills Academy (UK), PIETE, Univations GmbH (DE), Entrepreneur Academy (BE), Asociación Jóvenes Solidarios (ES), 1st EPAL of Lerapetra (GR), Silesian University (CZ), Instituto Superiore Luigi Einaudi (IT), Hireable (USA), AUPEX (ES), All Digital (EU) and European Grants International Academy (IT).

From this research and understanding of the landscape, the research team built a **comprehensive inventory of key data** that included:

- Characteristics of LMI leading each action: public, private or third sector / type of actor / individual or networked organisation / economic sectors served
- Stage/s of intervention in the employability path
- LMI goal/s for use of EntreComp and/or DigComp
- Target groups/beneficiaries of the services: unemployed / employee / entrepreneur(-to-be) / volunteers / vulnerable people (such as migrants, elder people, women, young, low skilled)
- Employee/job profiles addressed by implementation

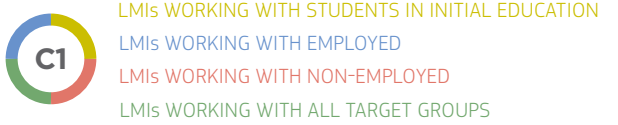
The selection of cases sought to capture those with sufficient maturity and ensuring a **diversity** in terms of:

- LMI actors across public, private and third sectors
- Interventions relevant across the employability path
- Target beneficiary groups of the services
- Multi-stakeholder co-operation models
- Geographic diversity across the EU

Cases' representation

All across the document, the 9 cases are symbolised with an **icon and a code**. Some cases contain 2 **subcases**, A and B.

The **icon's colour** reflects the **LMI types involved** (see **T.2**)



The icons are **interactive** and lead to the relative **full description's page** in the **Annex**.

Online resources

in the "Online resources" section available for each case study in the **Annex**, we provide links to publicly available tools, publications, services related to the case studies. There are often additional online resources with restricted access, for which the interested reader should make contact with the case contributors.

T.1 DIGCOMP CASE STUDIES IN ALPHABETICAL ORDER OF THE LEAD ORGANISATION

C1 A Pane e internet (PEI) B DCDS

BELGIUM • GREECE • **ITALY** • LATVIA • ROMANIA • SPAIN

AECA, the main association of VET organisations in Emilia Romagna, has provided services to the Emilia-Romagna regional government for the implementation of the Pane e Internet digital literacy project, has delivered the 3i informatics courses for unemployed people and is now in charge of the Digital Competence Development System project's methodology. All these initiatives base the design on their training offer on DigComp.

C2 ProDigeo

ITALY

Anpal Servizi, the operational arm of Anpal (Italian National agency for active employment policies), has developed the ProdiGeo eLearning platform and the Prodigeo course for training on digital competence the staff of public (Centri per l'impiego) and private employment offices. The course 10 modules were designed using DigComp.

C3 Ikanos

SPAIN

The Basque Country Government launched in 2012 the Ikanos project to create a learning support infrastructure for the digital competence needs of citizens, enterprises, civil servants and others. Ikanos used DigComp to design a self-assessment test (linked to career and training guidance) and various tools and services to develop digital competence for employability, including industry 4.0 job profiles.

C4 ECCC DigComp certification

POLAND

ECCC Foundation was established in 2009 to promote its newly designed European Computer Competence Certificate. In 2016, ECCC foundation modified its certification system with the addition of a DigComp area (validated in about 80 accredited examination centres) and set up a DigComp National Contact Point to promote the new standard and a coherent training offer.

C5 Compass

FRANCE • IRELAND • ITALY • ROMANIA

Expertise France, the French public agency for international technical assistance, coordinated the development of an up-skilling online training course for young unemployed people. The Compass platform offers a self-assessment tool and 18 lessons addressing 9 - DigComp competences in four occupation areas: teaching; business & administration; legal, social and cultural professions; general and keyboard clerks.

C6 MuSA

BELGIUM • **GREECE** • ITALY • PORTUGAL

Hellenic Open University coordinates the MuSA: Museum Sector Alliance project. This developed work profiles and an articulated training offer, based on the integration of DigComp and e-CF competences, for four new ICT-related job profiles in museums: digital strategy manager, digital collections curator, digital interactive experience developer, and online community manager.

C7 SmartiveMap

ITALY

Smartive, a start-up in Milan, developed SmartiveMap, a self-assessment tool to analyse digital transformation readiness of individuals and organisations, based on their openness to change and digital skills. Assessment questions on digital competence are partly drawn from DigComp and partly identified by experts of the main business functions: purchasing, operations, finance and controlling, marketing & sales, human resources and ICT.

C8 A BAIT B Pathways4Employ (P4E)

BELGIUM • GREECE • IRELAND • LATVIA • **SPAIN**

Tecnalia, Spain's largest private R&D entity, developed BAIT, the new digital competence certification system of Basque Country, fully based on DigComp and currently tested with IVAP (the Basque Institute of Public Administration) public employees. Tecnalia was also partner of the Pathways4Employ project, which used DigComp to define the digital profiles of entrepreneurs and virtual office workers and developed a self-assessment test on related digital skills.

C9 Adecco's Competences Dictionary

ITALY & GLOBAL

Adecco Group Italia, the largest private employment agency in Italy, is starting to use the new release of its (soft) Competences Dictionary which includes for the first time digital and entrepreneurial competences as defined by the DigComp and EntreComp frameworks. The Dictionary supports staff selection and assessment activities.

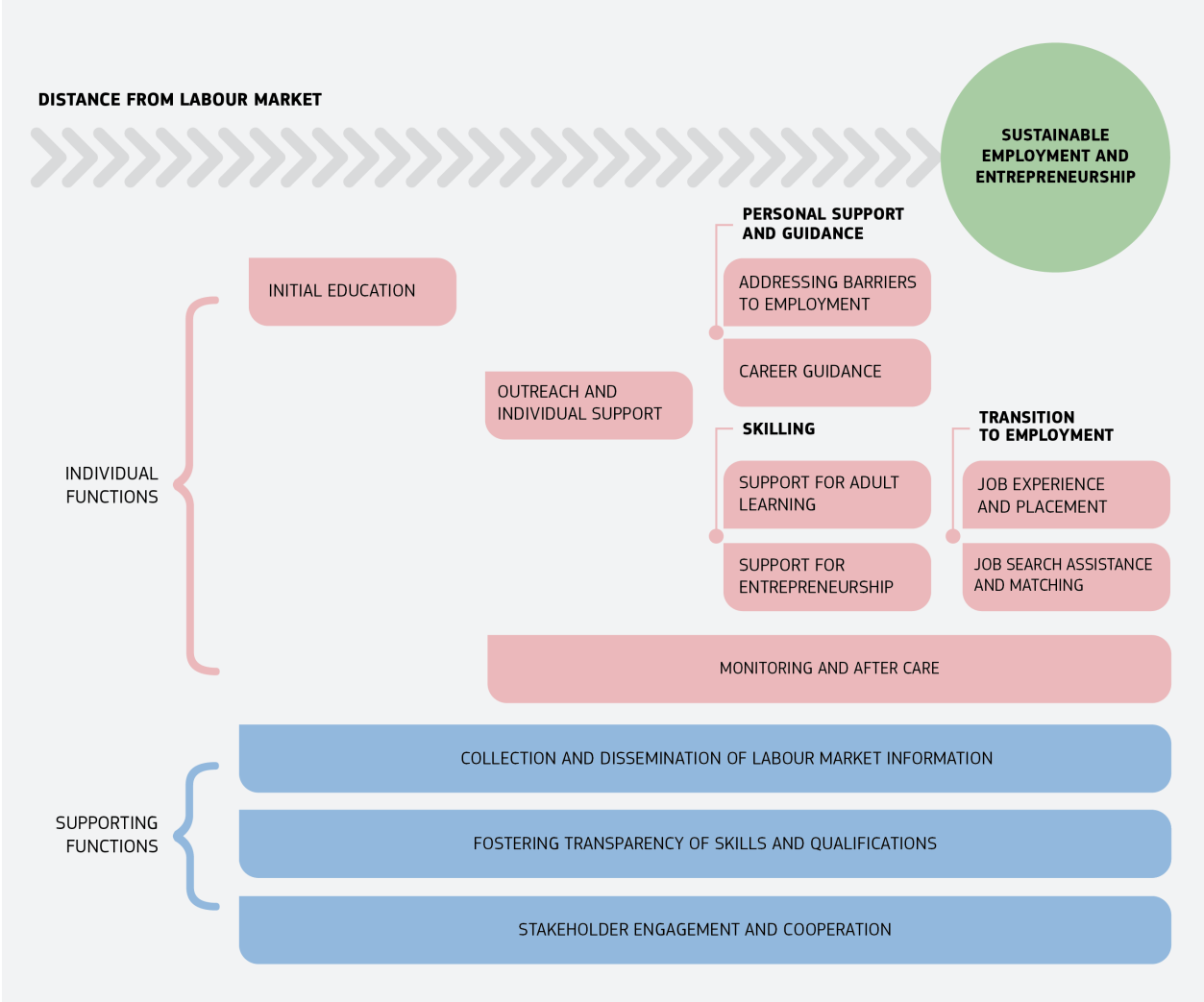
2.2 MAPPING OF DIGCOMP CASES SELECTED

Mapping along LMI types

IIn broad terms, Labour Market Intermediaries (LMI) help to lubricate the operation of the labour market by facilitating linkages between supply and demand. As labour markets have become more volatile, complex and unpredictable, these organisations play an increasingly important role.

LMIs include a range of organisations from the public, private and voluntary sectors, such as public employment services, welfare to work providers, private sector employment agencies, training providers, careers support services and community-based non-statutory organisations providing a range of tailored services to assist local clients to improve their employability and provide labour market and related advice. Working in partnership, these organisations tend to focus their efforts on different parts of the 'employability pathway' from engagement with out of work individuals (often involving outreach work), through positive engagement and assessment of individuals' barriers to employability and training and development needs, preparing for and seeking work, and in work support through aftercare programmes and workforce development to facilitate sustainability and progression in employment. At this latter stage, employers have a crucial role to play.

More concretely, the synthesis of the literature review identified 12 functions that are carried out by these broadly defined LMIs. **F.4** provides a map of these functions. Conceptually, the map is based on a premise that future (and current) employees and entrepreneurs have diverse needs, depending on their distance from the labour market. Hence, the map groups LMI skilling related functions on a continuum that measures the distance of served target groups from the labour mar-



F.4 LMI SKILLING RELATED FUNCTIONS ALONG THE EMPLOYABILITY PATH

T.2 DESCRIPTION OF LMI TYPES AND SUB-TYPES	
Type 1. LMIs working primarily with students in initial education	1.1 Formal educational institutions that deliver formal (to some point compulsory) schooling. They include: Primary and secondary schools (corresponding to ISCED levels 1-3;), as well as vocational education and training (VET) schools (ISCED levels 3-5 with vocational orientation) and higher education institutions (HEIs; ISCED levels 5-8);
	1.2 Non-formal education providers that offer extracurricular activities that complement the programmes of educational institutions (e.g. an after-school language course);
	1.3 Informal education providers that facilitate students' self-learning in the areas of their interest with no imposed course structure, external requirements, and assessment (e.g. a school chess club).
Type 2. LMIs primarily working with the non-employed	2.1 Public Employment Services, i.e. a public body, either a part of ministry of labour or, less often, a separate executive agency, that provide comprehensive support to the unemployed, and have legal obligations towards them;
	2.2 LMIs addressing critical barriers to employment – typically NGOs or social businesses that target specific vulnerable groups that need more intensive or specific professional support.
Type 3. LMIs primarily working with the employed	3.1 Trade unions, i.e. collective associations of employees;
	3.2 Employers and employer associations - collective associations of employers.
Type 4. LMIs working across all the target groups	4.2 Upskilling providers that provide adult training. These include formal, non-formal and informal professional and adult education providers. They consist of: Face-to-face and online training providers, as well as MOOC (Massive Open Online Course) platforms, that congregate distance learning courses offered by different HEIs.
	4.3 Job experience providers that enable allocation of individuals in a real work environment. They include: Providers of work-based learning (WBL, including internships, traineeships, apprenticeships, job-shadowing, etc.), volunteer opportunities; public works programmes and social enterprises and cooperatives.
	4.4 Job brokers that facilitate matching job seekers with vacancies. They include: job websites (platforms used to exchange information about vacancies and jobseekers' profiles), short-term employment facilitators (organisations that assist individuals / employers in finding temporary work / worker), and private recruitment agencies (that help employers fill their medium- and high-level vacancies).

ket. Some LMIs carry out most of the functions with the aim of bringing a particular target group closer to employment, while other LMIs work in a dense network to provide one or several functions. While most functions are provided to individuals, three of them (under "supporting functions") have a horizontal nature, as they are carried out to support the implementation of the other functions.

Furthermore, the journey to and through employment can be complex for the individual employee, employer and the LMI providing support. For example, whilst the steps may be followed in a linear way, individuals' experiences into and within the labour market rarely follow a direct path. As such, a challenge for LMI actors is to be flexible enough in their provision of skilling services for employability to meet the different needs of their clients.

Based on their skilling functions, LMIs can be classified according to two criteria: the functions or 'what they do' and intervention recipients or 'how they perform their functions' - as LMIs working with different groups adopt specific approaches and methodologies- results in groups of LMIs that are relatively homogenous in terms of functions performed and working methods adopted, as detailed in **T.2**.

In **T.3**, the different stakeholders participating in the DigComp cases are mapped along the LMI types. From the table we can observe:

- the variety of actors involved;
- the involvement of non-formal education institutions and up-skilling providers and experts, in particular of non-formal education providers addressing adult learners;

T.3 PARTICIPATION OF LMIS (PER TYPES) TO DIGCOMP CASES

LMIS PRIMARILY WORKING WITH..		RELATED CASES								
Students in initial education	Formal education institutions									
	Non-formal education providers					C5			C8 B	C9
	Informal education providers									
Non-employed	Public employment services	C1 AB	C2	C3	C4	C5				
	LMI's addressing critical barriers to employment	C1 AB				C5	C6		C8 B	
Employed	Trade unions									
	Employers and employer associations			C3	C4	C5	C6	C7	C8 AB	C9
All target groups	Upskilling providers	C1 AB	C2	C3	C4		C6	C7	C8 A	C9
	Job experience providers									
	Job brokers		C2	C3						

- the strong involvement of public or private employers in all cases where specific professional profiles have been addressed;
- the important role played by public employment services or private recruitment agencies (job brokers).

Mapping along LMI skilling functions

The analysis shows that only a sub-set of functions are provided by the DigComp cases ´ actors. Concretely, we did not find provision of the following specific functions: "initial education", "addressing barriers to employment" and "support for entrepreneurship".

The sub-set of skilling functions provided by LMIs in each of the cases are listed in **T.4**, reflecting the breadth of functions provided in each case. Collectively, the DigComp cases provide services with greatest prevalence (6 to 9 of the cases) in:

- design training / development;
- labour market skills analysis;
- assessment of skills;
- delivery of training / development;
- certification of competence.

T.4 LMI SKILLING FUNCTIONS PROVIDED BY CASES (✓ WHEN DIGCOMP IS USED, ✓ WHEN PERFORMED WITHOUT)

LMI SKILLING FUNCTIONS		C1 A	C1 B	C2	C3	C4	C5	C6	C7	C8 A	C8 B	C9
Collection and dissemination of labour market info	Labour market skills analysis (including analysis of PDPs)			✓	✓	✓	✓	✓	✓	✓	✓	✓
Outreach and individual support	Outreach to under/ unemployed	✓	✓		✓		✓					
Career guidance	Career advice			✓	✓		✓			✓		✓
	Personal development plan				✓		✓			✓		✓
Support for adult learning	Design and development of training	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	Delivery of training	✓	✓	✓	✓		✓	✓	✓			✓
	Workforce development				✓				✓			✓
Fostering transparency of skills and qualifications	Assessment of skills		✓		✓		✓		✓		✓	✓
	Certification of competence		✓	✓		✓	✓	✓		✓		
Job experience and placement	Liaising with employers for job placement / experience							✓				✓
Job search assistance and matching	Job search support			✓								✓
Monitoring and aftercare	Client tracking and monitoring				✓				✓			✓
	Employee support								✓			✓

Mapping along DigComp use

T.4 summarises which skilling functions along the employability path are provided by the experiences of the DigComp case studies. While different cases may provide functions across multiple steps in the employability pathway, they do not always explicitly use DigComp for each of them, as illustrated in the Table. DigComp implementation is mostly concentrated in the following functions:

- labour market skills analysis, which concerns the analysis of digital skills requirements of various occupations and the definition of related professional digital profiles;
- assessment and certification of digital skills;
- design, development and delivery of digital competence training offers.

As anticipated, digital competence development is the main focus of most initiatives and DigComp has been used both to identify the competence requirements of given jobs and then to design the training offers to develop those competences. Participants passing the final tests of those training offers receive a certificate for their learning achievements, referred to the course and/or to the digital competences developed through it. Digital competence certificates are issued in two cases (**C4** ECCC and **C8A** BAIT) also independently from course attendance. The analysis of competence requirements and initial digital competence assessment activities can also be undertaken without being directly linked to training activities.

DigComp has also been (or is currently being used) for development of a personal development plan and for career advice. However, these two applications of Dig-

T.5 EXPLICIT USE OF DIGCOMP PER LMI FUNCTION

LMI FUNCTION	DIGCOMP USE	RELATED CASES
Labour market skills analysis	Analysis of digital competence requirements in various occupations	C2, C4, C8 AB
	Design of professional digital profiles	C3, C5, C6, C7, C8 B
	Benchmarking services in business sectors aiming at identifying skill requirements at organisational level and at comparing your skill level with organisation´s competitors	C3, C7
Career advice	DigComp used for career advice/guidance	C3
	Link self-assessment and training offer to specific careers	C5, C8 B
Personal development plan	DigComp used for further training and/or career advice/guidance	C3
	Link self-assessment and training offer to specific occupational profiles	C5, C8 B
Design and delivery of training	DigComp use for training offers	C1 AB, C2, C3, C4, C5, C6, C8 A
Workforce development	DigComp-based skills assessments	C3, C7
Assessment of skills	Design of DigComp-based (self-)assessment tools	C1 B, C3, C5, C7, C8 B
Certification of competence	Certification of DigComp competence or Certification of course completion	C1 A, C2, C4, C5, C6, C8 AB

Comp are in e**arly stages**, and not enough information nor evidence was available to analyse them and provide useful conclusions. T.5 provides a more detailed overview of DigComp use within the cases analysed per skilling function. Finally, analysis has identified two interesting emerging usages of DigComp: for benchmarking services, and for the development of personal learning environments, which are explored further in the next section.

Mapping along stakeholders and cooperation models

(Local) governance of strategies to improve employability of unemployed people matters. In particular, the inclusion of employers, trade unions and other stakeholders in the planning of service provision for job seekers, while allowing for the tailoring of employability services to reflect the dynamics of local labour markets, are important foundations for success. Successful partnership-based approaches to tackling employability need a clear strategic focus based on a necessity for inter-agency cooperation and institutional arrangements that allow for shared ownership, trust and flexibility in resource sharing.

These strategic cooperation approaches have been observed in the DigComp cases analysed. **T.6** illustrates the range of stakeholders engaged in DigComp implementations and the type of relationships with them by those leading the activities.

The DigComp case studies clearly show that the activities needed to implement the framework, i.e. to customise and specify it operationally for each local context (language, sector, job profile, target group etc.) and for different purposes/steps (identification of professional digital competence, assessment, training design and delivery, competence evaluation and certification) require the participation of diverse and usually multiple stakeholders. The lists in **T.6** are inevitably partial and they do not include end-users and/or their representatives, which are of course part of the implementation experiences.

T.6 shows that different types of multi-stakeholder relationships are developed when DigComp implementations are part of policy initiatives (**C1A** PeI, **C1B** DCDS, **C3** Ikanos and **C8A** BAIT), with institutional collaborations tending to be established over time. In many cases, the involvement of stakeholders occurs temporarily, for project-driven research and consultation activities (**C1A** PeI, **C1B** DCDS, **C2** Prodigeo, **C5** Compass, **C8B** P4E). In the **C6** Mu.SA case, repeated experiences in the same/similar sector and with the same/similar partners allowed framing such research and consultation activities in a more continuous perspective. Service providers (**C4** ECCC on a non-profit, **C7** SmartiveMap and **C9** Adecco on a commercial basis) have a continuous dialogue with their customers, on the one hand, and with sources of ideas and useful solutions for their activities, on the other. This occurs also with Ikanos, reflecting its growing support to business companies for Industry 4.0 digital competence needs. **C3** Ikanos and **C7** SmartiveMap also share a very interesting and unique (among the current case studies) emerging cooperation model, relying on a sort of community of practice: the Ikanos practitioners who develop and share their experience on the design and assessment of professional digital profiles according to the Ikanos approach; and the SmartiveMap editors (specialists from various business functions), who collaborate with Smartive to identify functional digital competences for business, assess them and maintain them over time.

The case studies also show that DigComp implementation processes entail a shared learning process among those involved, starting from a reflection about digital competence and some degree of understanding of the DigComp framework (and possibly other frameworks used in the process). Most of the experiences studied mention that stakeholders (especially companies, end-users and intermediaries) were often hardly aware of and had only vague notions of digital competence and related requirements for current and even more for prospective occupations. For this reason, one of the important benefits of using DigComp is precisely that it offers a clear and relatively simple definition and description of digital competence, which helps to start useful dialogues about this topic.

Also, experts and practitioners implementing DigComp (and working on digital competence in general) talk about a significant learning curve needed to understand how to fully and effectively exploit the framework, especially in the work/business environment for which it was not specifically designed.

To sum up, DigComp implementation requires a learning process that can be long and almost always entails the participation of multiple stakeholders, resulting for both reasons in a relevant investment of resources.

The use of advanced solutions for the analysis of digital competence requirements in existing and new jobs (discussed before) may facilitate and accelerate these processes, but it has a cost in itself and stakeholders involvement is needed to develop an understanding of the issues at stake and ultimately to achieve wider adoption of the proposed solutions.

T.6 STAKEHOLDERS INVOLVED IN DIGCOMP CASE STUDIES AND COOPERATION MODELS

CASE	STAKEHOLDER TYPE (leading in bold)	TYPE OF RELATIONSHIP			
		institutional collaboration	project-driven	continuous dialogue	other
C1 **AB** PEI + DCDS	**Regional Government and Training NGO (association of VET providers for PeI)** **European NGO (association of digital competence centres for DCDS)** Public administrations / Educational experts / VET providers / Public employment agencies	✓	✓		
C2 PRODIGEO	**Ministry of Labour and Social Policy** Public and private employment agencies / Educational experts	✓	✓		Within which project-driven collaborations take place
C3 IKANOS	**Regional Government** Public administrations / University / Educational experts / Companies / Public and private employment agencies	✓			Ikanos practitioner community
C4 ECCC	**Research and development NGO** University / Educational organisations / Public administrations / Companies / Labour offices			✓	
C5 COMPASS	**Public agency for international assistance** Educational organisations / Employers / Labour market actors		✓		
C6 MU.SA	**University** Museum and culture sector professionals / Museum and culture sector organisations / Public administrations / VET providers / Third sector organisations / Companies / University		✓		Prolonged through different projects
C7 SMARTIVE	**Private company (service provider)** Companies / Business function managers and specialists / Business consultants			✓	SmartiveMap editors
C8 **A** BAIT	**Private research foundation** University / Public administrations	✓		✓	
C8 **B** P4E	**Third sector organisations** Companies / Free-lance professionals		✓		
C9 ADECCO	**Private Companies (employment services)** Educational organisation / University			✓	

2.3 HOW DIGCOMP IS HELPING STAKEHOLDERS

The use of DigComp for the analysis of competence requirements and the definition of professional digital profiles

The specific contribution of DigComp to LMIs operating along the employability pathway is its support to the identification of the digital competences required today in professional activities, referred to with minor semantic nuances as jobs, job roles, professions or occupations. In the DigComp case studies, digital competence requirements have been analysed with respect to:

- **A**: more or less broadly defined **existing occupations** (e.g. administrative worker in the public administration, general office clerk, primary school and early childhood teacher etc.);
- **B**: also referring to generic **business functions** (Operations and industrial services, Marketing & Sales, etc.);
- **C**: **generic work conditions** (entrepreneur, virtual office worker, consultant for the Third Sector, employment services staff);
- **D**: **new IT-intensive jobs** in different economic sectors (Industry 4.0 jobs in manufacturing, new digital jobs in museums), and distinct from IT specialist job profiles.

These analyses and the definition of professional digital profiles (PDPs) have addressed jobs in different organisations (from large companies to SMES, consultants and self-employees in general) and economic sectors: public administration and other public activities (e.g. in education and cultural sector); public and private employment services; the manufacturing industry, the cultural and creative industries.

T.7 OCCUPATIONS´ COMPETENCE REQUIREMENTS IN THE DIGCOMP CASE STUDIES

CASES	OCCUPATIONS	AIMS	COMPETENCES ADDRESSED
		Professional digital profile (PDP) training (T) assessment (A) certification (C)	DigComp competences (DC-C), DigComp level (DC-L), Ad-hoc sub-competences (AH), e-CF (e-CF), soft skills (SS)
C2 PRODIGEO	Employment services staff (C)	T	DC-C DC-L
C3 IKANOS	Various occupations (A, B, C, D)	PDP A	DC-C DC-L AH
C5 COMPASS	8 occupations (A)	PDP T	DC-C DC-L SS
C6 MU.SA	4 occupations (D)	PDP T	DC-C DC-L e-CF SS
C7 SMARTIVE	7 occupations (B)	A	DC-C Functional digital competences + openness to change competence
C8 A BAIT	2 occupations (A)	T C	DC-C DC-L
C8 B P4E	2 occupations (C)	PDP A	DC-C DC-L
C9 ADECCO	2 occupations (C)	PDP A	DC-C DC-L

T.7 summarises the occupations whose digital competence requirements have been analysed in the DigComp case studies (classified according to the above categories), its aims and the aspects considered in the analysis of job requirements: DigComp competences (possibly at different proficiency levels), other digital skills and/or soft skills. The identification of the relevant digital competences of an occupation may be aimed at the definition/description of the so-called **professional digital profiles** (PDPs), and/or at the design of training and/or assessment solutions, based on the identified competence requirements.

T.8 provides the full list of professional profiles identified and **T.9** provides the list of DigComp competences (including their proficiency level and relevance to the job), as they are addressed in the PDPs.

The analysis contained in **T.9** does not include all PDPs, because their detailed definitions are not always available. Its content also reflects the fact that the approaches to using DigComp to define the detailed competence requirements in those PDPs, which are available, are not standardised. The PDP descriptions, when available, can be found in the case studies or online, at the links provided in the cases' Resources section. **T.9**shows that seven DigComp competences (1.1, 2.1, 2.4, 3.1, 3.4, 4.1 and 4.2) are present in over 75% of the PDPs examined. At the same time, three competences (2.3, 3.2 and 3.3) are present in only about a third of the profiles.

T.8 OCCUPATIONS ´ COMPETENCE REQUIREMENTS IN THE DIGCOMP CASE STUDIES

A: more or less broadly defined existing occupations; B: referring to generic business functions; C: generic work conditions; D: new IT-intensive jobs in Industry 4.0 in manufacturing, new digital jobs in museum

C2	Employment services staff	C		General office clerks	A
	Administrative staff in public organisations	A	C5	Secretaries (general)	A
	Industrial machine operato	A		Authors, journalists and linguists	A
	Sales representative	B		Creative and performing artists	A
	Entrepreneur	C		Digital Strategy Manager	D
	Mechatronics/robotics technician	D	C6	Digital Collections Curator	D
	Industrial machinery operator and CNC programmer	D		Digital Interactive Experience Developer	D
C3	Advanced manufacturing maintenance technician	D		Online Community Manager	D
	3D designer for additive manufacturing	D		Finance and controlling	B
	Additive manufacturing machinery operator	D		Marketing & Sales	B
	SME digital transformation manager	D		Human Resources	B
	Consultant on services/programs for the Third Sector	C	C7	ICT services	B
	Economist - Business Manager	C		Operations and industrial services	B
	Economist – Consultant	C		Legal affairs	B
	Economist - Specialist in digital marketing	D		Research and development (underway)	B
	Vocational education teachers	A	A C8	Administrativo	A
C5	Primary school and early childhood teachers	A		Auxiliario administrative	A
	Finance professionals	A	B C8	(self) Entrepreneur	C
	Sales, marketing and PR professional	A		Virtual office worker	C

T.9 DIGCOMP COMPETENCES, LEVELS AND RELEVANCE IN THE PROFESSIONAL DIGITAL PROFILES (DIGCOMP PROFICIENCY LEVELS: F=FOUNDATION, I=INTERMEDIATE, A=ADVANCED, OR NUMBERS FROM LEVEL 1 TO 8)

	Case studies	1.1 Browsing, searching and filtering	1.2 Evaluating	1.3 Managing	2.1 Interacting	2.2 Sharing	2.3 Engaging in citizenship	2.4 Collaborating	2.5 Netiquette	2.6 Managing digital identity
C2	Employment services staff	I	A	I	I	I	I	A	I	A
	Administrative staff in public organisations	F		I	F	F	I	F	F	
	Industrial machine operator	F	F							
	Sales representative	I	F	I	F	F		F	F	
	Entrepreneur	F	I	F	F	F	I		F	A
C3	Mechatronics/robotics technician	A	I	I	F	F	F	F		I
	Industrial machinery operator and CNC prog.	F	I / A	F	F	F		I		
	Advanced manufacturing maintenance technician	A	I	I	F	F		F		
	3D designer for additive manufacturing	A	A	I	I	I	F	I	I	F
	Additive manufacturing machinery operator		I	F	I	F		F		
	SME digital transformation manager	A	I	I	I	F	F	A	A	I
	Vocational education teachers	F			F					
	Primary school and early childhood teachers	F			F					
	Finance professionals	A			F			F		
C5	Sales, marketing and PR professions	F			A	F		F		
	General office clerks	A				A		A		
	Secretaries (general)	A			F			A		
	Authors, journalists and linguists	A			A	F				
	Creative and performing artists	A			A	F		F		
	Digital Strategy Manager	8	7	8				8	7	7
C6	Digital Collections Curator	8	7	8				8	7	7
	Digital Interactive Experience Developer	8	7	8				8	7	7
	Online Community Manager	8	7	8				8	7	7
C8 B	(self) Entrepreneur	7	6	6	6	6	5	6	6	7
	Virtual office worker	6	6	6	6	6		6	5	6
% of PDP with DigComp competence X		**96%**	64%	64%	**76%**	64%	28%	**80%**	48%	44%

Colours reflect relevance of competence: Green = core competence, Orange = transversal competence (common to several tasks in the occupation) , Yellow = complementary competence (helps, but not necessary), White = not relevant, Grey = no classification

3.1 Developing content	3.2 Integrating and re-elaborating	3.3 Copyright and licenses	3.4 Program.	4.1 Protecting devices	4.2 Protect personal data and privacy	4.3 Protect health and well-being	4.4 Protect the environm.	5.1 Solving technical problems	5.2 Identifying needs and responses	5.3 Creatively using	5.4 Identifying digital comp. gaps
I	A	I		F	I				I	A	I
A	F		F			F		F	F		F
			F	F		F		F	F		F
F						F		F	F		F
F		F		F	I	F		F	A	I	F
I	I	F	I	I	F	I	I	A	A	F	I
I	I		I		I	I	F	I /A	I /A		I /A
I		I	I	I	F	I	I	A	A	A	A
I /A	I	I	A	F	F	I	I	A	A	A	A
	A		F	F		I		F	F		
I	I	I	I	F	I	I	I	A	A	I	A
A			F	A	A					F	
A			F	A	A					A	
A			A		F					A	
A			A							A	
F			F	F	F						
F			A	F	F						
A			F	F	F					F	
A			F							F	
7			6	7	7	7	7	7	7	8	6
7			6	7	7	7	7	7	7	8	6
7			6	7	7	7	7	7	7	8	6
7			6	7	7	7	7	7	7	8	6
6	5	5		5	6	5	4	4	6	5	5
6	5	4		6	6	4		5	5	4	4
92%	36%	32%	80%	76%	76%	64%	40%	64%	68%	72%	64%

Considerations about the definition of professional digital profiles in the wider context of the digital transformation

Interestingly, the three experiences, which felt the need to integrate DigComp with other digital competences for a fuller picture of the digital competence requirements of given occupations have all adopted a clear digital transformation perspective in their endeavours. On the one hand, this perspective seems to give much importance to the widespread development of transversal digital, and soft skills, within the organisations who want to move along that path. Developing digital culture across the board and making the digital an integral element of all activities are key elements of this perspective, and DigComp is seen as very useful tool for that. The recent inclusion of digital competence in Adecco's Competences Dictionary seems to confirm this view.

On the other hand, the digital transformation perspective highlights the emergence and need of new digital skills to perform both existing jobs -under transformation- and new jobs, very often created by new technological and market opportunities. These new skills may be related to specific jobs, or to broader professional categories, or they may cut across jobs and professional categories. They may be close to those of IT professionals (included in the e-CF) or they may be currently "unclassified", leading to "ad hoc" identification and definition efforts such as those illustrated above. These may also be identified following the use of entirely new approaches (as in the example of Technimetro and other tools used by Adecco) to identify emerging and future skills through the analysis of scientific publications, patents registration and web job offers. In any case, these new digital skills are not explicitly included in DigComp descriptors and integrating them in the current DigComp framework is sometimes possible (as showed by **C3** Ikanos), but not always feasible.

Summing up, differences across the DigComp case studies in dealing with PDPs reflect many factors:

- type of experience (medium to long term business development or policy strategies vs short term project-based initiatives);
- budget available (carrying out in-depth and perspective analyses of work transformation is very time and resource consuming);
- dialogue with multiple stakeholders and access to (often difficult to find) forward looking experts;
- the leading organisation's perception and understanding of the competence challenges brought about by the digital transformation.

In our opinion, this last factor is particularly important. This translates as the need to consider the multiple competence dimensions at play (hard and soft digital skills, behavioural/soft competences and others) in existing and especially in new jobs today, and the need to address all of them for employability in the digital transformation perspective. This awareness is not yet widespread and is only gradually growing. Not by chance, it is higher -and translated into more articulated and strategic approaches in PDP elaboration- among organisations with a longer and/or deeper experience in working on digital transformation.

In addition, other factors influence the definition of new jobs and related PDPs such as the speed of change of technology, the work context and organisations ´ expertise on available digital competence frameworks. This is illustrated by **C6** Mu.SA,'s need to deeply revise the job profiles defined 2 years earlier in the previous e-Cult project (more or less by the same partners and in the same sector) due to changes in technological and market opportunities, to a more accurate consideration of the work context. No point in designing a profile which is too complex for a given work environment and/or target group), and to a shift in the investigation approach (the adoption of other competence frameworks besides e-CF.

The development by **C9** Adecco and **C7** SmartiveMap of various personalised assessment and training services for their business customers shows the complexity (and business opportunities coming from it) of identifying correctly the mix and level of soft competences and digital skills requirements of companies today.

The use of DigComp for assessment tests, recognition and certification

T.10 shows that in all the case studies DigComp has been used for competence assessment and/or certification purposes. We deal with these two steps together as they have essentially a similar content.Tests differ depending on the types of questions they use:

- self-perception and self-assessment questions ask respondents how confident, strong etc. they feel with respect to some topic, activity etc., whether or how much they know and/or are able to do certain things, etc;
- knowledge questions are designed to check whether the respondent knows or not a given piece of knowledge, the right action to achieve a result or the right

T.10 COMPETENCE ASSESSMENT AND CERTIFICATION IN THE DIGCOMP CASE STUDIES

	CASE	C1 A	C1 B	C2	C3	C4	C5	C6	C7	C8 A	C8 B
Test type	Self-Perception, self-Assessment Questions		✓		✓		✓				✓
	Knowledge Questions		✓	✓		✓	✓	✓	✓	✓	✓
	Performance Based		✓			✓ advanced levels only	✓			✓	✓
Training	Pre-course		✓								
	Post-course		✓	✓				✓	✓	✓	
Output	Self-assessment Feedback		✓				✓				
	Course Badge / Certificate	✓ B	✓ B	✓ C				✓ C			
	Competence Badge / Certif.		✓ B			✓ C	✓ B			✓ C	✓ B
	Personal profile				✓				✓		✓
	PDP badge							✓			✓

behaviour in a given circumstance etc. by picking the right answer among a set of options;

- performance-based tests require users to perform some tasks in order to give the requested answer or complete an assignment.

In most cases, tests are based on knowledge and self-assessment questions, as these are most man-ageable with fully online procedures that are quicker to deliver. Performance based tests either require sophisticated simulations and other somewhat complex technical solutions (e.g. **C8A** BAIT), or the direct observation and/or intervention of an evaluator (e.g. **C1B** DCDS, **C4** ECCC for advanced level), and take longer to be executed. A pure self-perception test has been used only in the DCDS project before the course, with the aim to gauge how strong respondents felt (rather than measuring their initial competence), before recommending them to take the basic digital literacy course.

In most cases, the tests designed have standard features and address different (or all) DigComp competences and levels. Two case studies (**C7** SmartiveMap and **C3** Ikanos) have developed assessment systems which can be customized to reflect different occupational profiles and needs (e.g. the monitoring of competence development over time) of the organisations who use the test.

The cases analysed issue two types of digital credentials for learning achievements: certificates and badges. The choice of format reflects what is commonly seen today among credential issuers (this summary is drawn from accredible.com/credentials/). **Digital certificates** are used when an achievement takes a long time to complete (e.g. a course that takes more than 40 hours);

assessment of the achievement is formal (summative with invigilated and assessed examination)and/ or employers are likely to view the achievement (e.g. professional certification of a skill). **Digital badges** are used when an achievement does not take too long to complete (e.g. an online course that takes 2 hours); assessment of the achievement is informal (formative, as with an unmarked quiz); recipients complete many achievements of a similar type (e.g. a set of modules within a longer course, or a university degree).

The analysis of the cases using DigComp for competence assessment and certification, shows that digital competence tests may be offered/taken for different aims and with different output:

- to get a personal digital competence profile (**C7** SmartiveMap and **C3** Ikanos), that may then be used for individual (training or professional) guidance, and/or for organisation-level or even sector-level analysis, by aggregating a large number of test results, in order to plan training and learning activities to overcome competence gaps (**C7** SmartiveMap and **C3** Ikanos);
- to map employees' profiles, identify talents and potential digital champions in preparation for digital transformation initiatives in a company and to monitor improvements in ongoing transformation processes (**C7** SmartiveMap);
- to get a professional digital profile badge or certificate, as in the case of entrepreneurs and virtual office workers (**C8B** P4E) and of new digital museum jobs (**C6** Mu.SA);
- to get a competence certification (**C4** ECCC, **C8** BAIT) for employability purposes or other reasons (e.g. following a regulatory requirement as with EU-funded training projects in Poland);
- to assess participants' skills before starting a course (**C1B** DCDS, **C5** Compass) and for summative assessment purposes during a course, with the issuing of intermediate and final badges or certificates (**C1B** DCDS, **C5** Compass, **C6** Mu.SA, **C8A** BAIT). Depending on how the course and the assessment are organised, these credentials may refer to specific DigComp areas or competences and/or to course completion.

T.11 DIGITAL COMPETENCE TRAINING IN THE DIGCOMP CASE STUDIES

TRAINING DESIGN BASED ON...	DIGCOMP CASES
Comparison of existing training	C1 A, C5, C8 A
Direct DigComp specification	C1 B, C4
User needs analysis	C2, C5, C6, C7

The evaluation criteria (e.g. how many correct answers are required to pass a given test) and other accreditation aspects (e.g. the use of e-portfolios to document learning achievements, as in **C3** Ikanos and **C5** Compass) vary across experiences, reflecting the target group and aims of the initiatives, but also different orientations by those running them.

An interesting feature emerging from the case studies is the integration of assessment results in so-called "personal learning environments" (also known as "individual learning accounts") and other solutions to support competence development in a life-long learning perspective. More on this in next Section below.

The use of DigComp to design training offers

As mentioned before, almost all the case studies have used DigComp to design and deliver training on digital competence. **C3** Ikanos is not listed in **T.11**, because it is not directly involved in training design and delivery, which is rather managed by the KZgunea Basque network of digital competence centres, or by Mondragon University for the courses for **C8A** BAIT certification.

C8B P4E does not provide courses. **C4** ECCC also does not deliver training, but it has designed training syllabi for organisations who prepare candidates for its ECCC DigComp certification. The identification and/or design of training content for digital competence courses stem from different processes (which of course are always to some extent at play, but with varying intensity):

- the comparison of existing training offers with targeted/ desired DigComp competences highlighting gaps to be filled (C8A BAIT with public administrative staff, **C5** Compass in the initial user needs analysis, **C1A** PeI in the revision of previous digital literacy courses);
- the direct specification of DigComp competences learning outcomes and subsequent training content development in view of given project goals (**C1B** DCDS design of foundation level training for all 21 DigComp competences) or certification aims (**C4** ECCC covering all DigComp competences at all proficiency levels);
- in-depth user needs analyses which identify training priorities and content in view of given professional digital profiles or development goals defined in terms of DigComp (and possibly other) competences (**C2** Prodigeo, **C5** Compass, **C6** Mu.SA, **C7** SmartiveMap).

As mentioned before, courses may be structured to reflect either directly (**C2** Prodigeo, **C5** Compass, **C6** Mu.SA, **C8A** BAIT, **C4** ECCC) or indirectly (**C1A** PeI **C1B** DCDS) DigComp areas and competences.

An important -unresolved- aspect to enable a greater diffusion of DigComp-based or DigComp-compliant training offers, and for further uses, concerns the ways of mapping DigComp areas and competences with existing digital competence courses which were designed without using DigComp as a reference. When this was done in the experiences studied, the process was always very laborious, as it required to look carefully at existing course contents and find a precise correspondence with DigComp competence areas, individual competences and proficiency level descriptors. **C3** Ikanos has been developing a guide for training providers to "classify" their offer according to DigComp categories, so as to obtain a DigComp label and to facilitate matching self-assessment test results (showing gaps in given competences) with available training offers. This report has not yet been finalised and tested on the field. An alternative approach might be to apply semantic analysis techniques to online training offers, similar to what innovative labour market analysis services do with online job offers to identify emerging skills requirements.

Finally, it is useful to highlight some of the main benefits of DigComp implementations for training. From the point of view of instruction designers, the clear and well-articulated structure of the framework (areas, competences, dimensions etc.) is considered very useful: to support training design (which can follow the same structure); to facilitate dialogue and cooperation with experts and other contributors in content selection and production; and in a dynamic perspective, to make course maintenance easier. Given the need to update and integrate training in the light of continuous and fast changes in digital technology, applications, services etc., both **C6** Mu.SA and **C2** Prodigeo expect that the competence-based and learning outcomes-based modular structure of the courses they designed following DigComp will make it possible and easier to remove, replace or upgrade only the parts of the

2.4 HIGHLIGHTING EMERGING USES OF DIGCOMP

Two new emerging uses of the DigComp Framework have been identified through the case studies, which are important in the employability perspective: the development of digital competence benchmarking services and of personal learning support services.

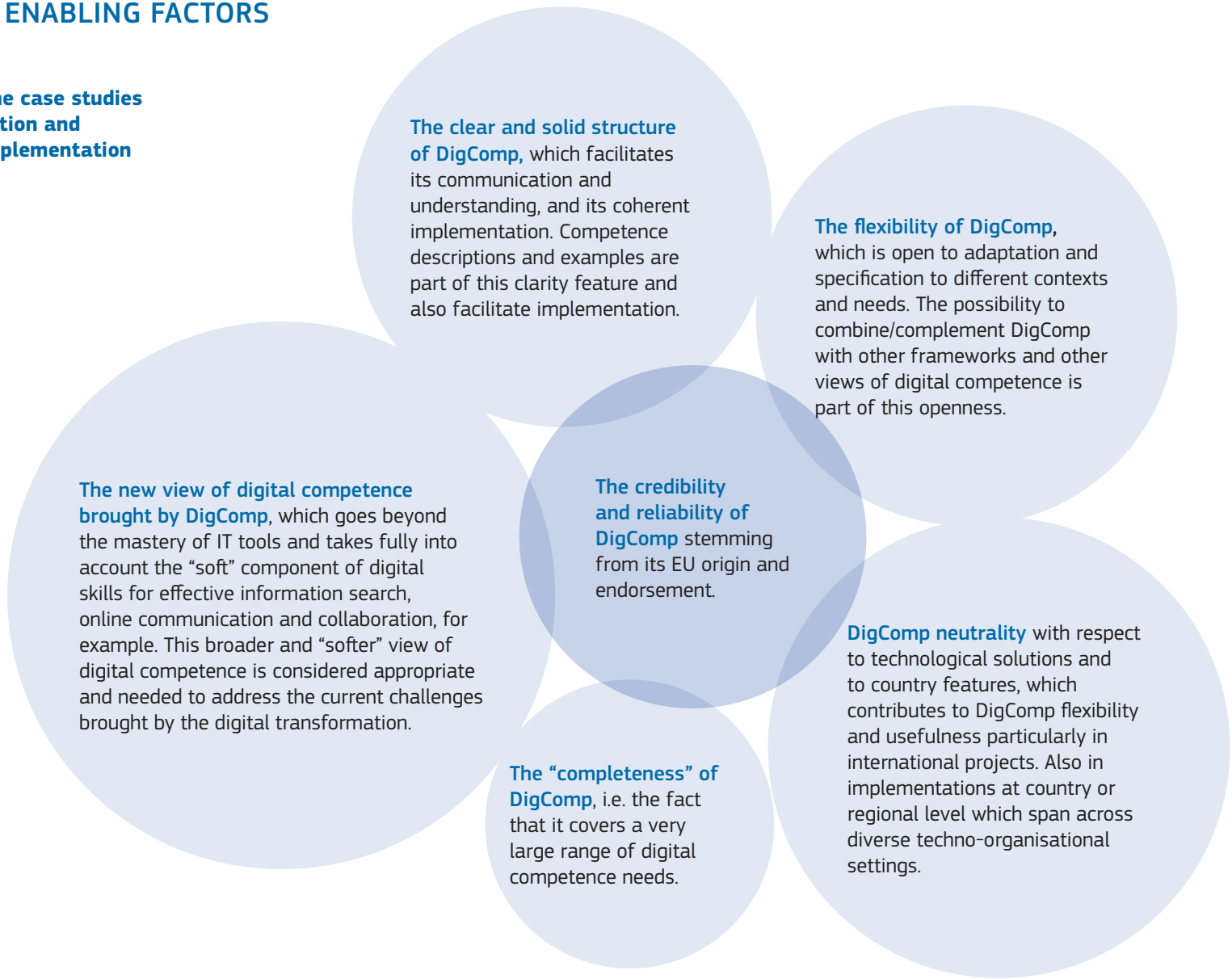
Both **C3** Ikanos and **C7** SmartiveMap mentioned a growing demand for **company (organisational and functional) digital competence benchmarking services** and are working to develop a response for that. The idea is to measure with their self-assessment tools a company's digital competence profile and/or index (at full organisational level and at business function level), and compare them to the industry average, to the score of market leaders or their main competitors. With the increasing importance of digital transformation as a key driver of business competitiveness, companies want and need to know their position in this domain and to measure their progress following any strategic improvement measures they undertake, in terms of in-ternal skilling and re-skilling, or of recruitment of new staff. Digital competence is not the only dimension of digital transformation readiness and progress, but it is certainly an important one. The use in as many instances and circumstances as possible of a common framework, such as DigComp, is essential to develop the above services.

The highly dynamic character of digital competence, the variety of means and available opportunities (formal, non-formal and informal) to develop it, and the workforce mobility, are the three key factors leading some actors (**C3** Ikanos, **C9** Adecco and **C7** SmartiveMap) to develop new solutions with different names -**personal learning environment, individual learning accounts, employability support platform** and others- and partly different features, but a broadly common aim. The goal is to help individual users, ideally through integrated services, to understand which digital (and other) competences they need for professional (and other) purposes, to map their level and evolution over time, to identify and keep track of learning experiences and to document learning achievements, in a continuous, lifelong learning perspective. Also, in this case, the use in as many circumstances as possible of a common framework such as DigComp (or cross-framework correspondence schemes), will likely prove essential to develop such services.

The general overview from the case studies of current and potential DigComp implementations in an employability perspective shows that DigComp can be and is being used in a variety of useful ways. However, the experiences told by those who carried out DigComp implementations about the context in which they operated and the stakeholders they involved also show that **DigComp is hardly known in the business and professional world**. This seems to be true also among labour market intermediaries, be they public employment services (as results to different degrees from the stories collected in Italy, Poland and Spain) or a private agency such as Adecco. This occurs in a context where the development of digital competence is increasingly and widely perceived as a key factor for the digital transformation that is reaching and challenging all or-ganisations. Stakeholders are becoming aware that it is now an important issue for everybody and not just for specialist IT staff. It is an issue that goes beyond just learning how to use some digital tools (more or less specific to a job or transversal to many occupations), but rather concerns broader (and less defined) "digital culture" aspects, which have much to do with soft skills in general and digital soft skills. Companies are becoming aware of these aspects and are seriously concerned, as they have an urgency, but also, they do not see any clear or ready-made answer to adopt. DigComp can certainly help in this context, as it addresses an important part – the transversal, company-wide component- of the digital competence required by most people working today in an organisation.

2.5 KEY SUCCESS AND ENABLING FACTORS

The key factors mentioned in the case studies which motivated DigComp adoption and contributed to its successful implementation can be summarized as follows:



ANNEX. DIGCOMP CASE STUDIES

C1 A PANE E INTERNET B DCDS

BELGIUM • GREECE • **ITALY** • LATVIA • ROMANIA • SPAIN

AECA, the association of VET organisations in Emilia Romagna, is involved in several projects under the regional government's e-inclusion and active labour market policies, which address the serious digital skills gap in Italy, as well as inclusion of unemployed adults and younger people.

The Pane e Internet (PeI) project used DigComp in 2013 (first implementation in Italy) to redesign its basic digital literacy courses. AECA used the PeI DigComp-based format in 2018 in the 3i informatics courses for unemployed people run within public employment services.

PeI also inspired the Erasmus+ KA3 Digital Competence Development System (DCDS) project, coordinated by All Digital, which is currently underway. DCDS is testing a blended learning system to develop all 21 DigComp competences at level 1-2, aiming at adults 25+ years old.

The case in brief

Leading organisation	**AECA**
Sector	NGO (association of VET organisations)
Start / end date	(**A**) 2009 – ongoing (**B**) 01/2018 – 12/2019
Geographical scope covered	National, Italy / European
Target audience	Unemployed people • people at risk of exclusion
Professional sectors covered	-
Employee profiles covered	-
Stakeholders involved	VET organisations • local public administrations • public employment agencies
Online resources	Pane e Internet learning resources (in italian) Measuring the Impact of Inclusion Actors (MIREIA): Impact Assessment Framework Main Report (**A**) Digital Competence Development Methodology (DCDM) (**B**) DCDS Contents of the self-assessment tool (**B**)
Tools	1. Impact Assessment of Pane e Internet For Work Project (**A**) 2. Entry questionnaire for 3i Digital literacy courses
Contributors	AECA (Pane e Internet project) - Alex Boschetti Ervet / AECA (DCDS project) - Stefano Kluzer AECA, Head of Employment Area - Bruno Timoncini

LMI Skilling functions provided

(✓ when DigComp is used, ✓ when not)

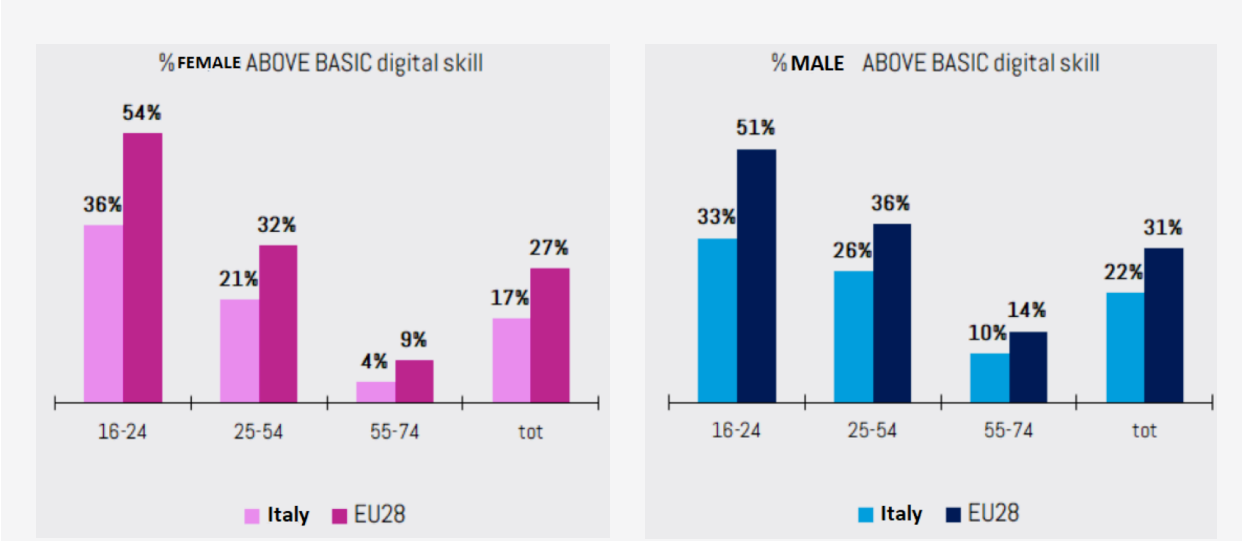
Labour market skills analysis	
Outreach to under/unemployed	✓ A B
Careers advice	
Personal development plan	
Design and development of training	✓ A B
Delivery of training	✓ A B
Workforce development	
Assessment of skills	✓ B
Certification of competence	✓ B
Liaising with employers for job placement / experience	
Job search / support	
Client tracking and monitoring	
Employee support	

CONTEXT AND DRIVERS

In Italy, the percentage of people with "above basic digital skills" was, in 2016, significantly lower than EU28 average, as in **F.5**. Of specific concern were age and gender gaps. The Italian situation results in the first place from demographic factors (high share of older people), and the average low level of formal education, especially among older people, which are both negatively correlated with digital skills levels. The limited role of the school system in the development of digital competence, and the overwhelming preponderance of micro- and small-medium enterprises in the Italian economy (which invest less than larger companies in digitally upskilling their workforce) also contribute to the low digital skills profile of Italy, as compared to other European countries.

Beyond statistical evidence, the need to increase digital competence to enhance the employability of young people and adults alike has emerged quite clearly in recent years. With the reform of Italian active employ ment policies in 2014-15, public job centres operaTing in Italy at provincial and sub-provincial level (called Centri per l'Impiego, CPIs, with 840 access points in 2017) are asked to develop the capacity of people seeking work to actively search for a job, or to under take some (self-)entrepreneurial activity. This goal is considered important given the increasing turnover and lower job creation rates in the labour market observed in recent years, and it concerns both younger and older people.

Young people are seldom taught at school or at university how to search for a job. The implementation of the Youth Guarantee programme (launched in 2014 for



F.5 PEOPLE WITH ABOVE BASIC DIGITAL SKILLS BY GENDER AND AGE GROUP, ITALY VS EU28 AVERAGE
(Source: Elaboration by Emilia-Romagna Digital Agenda Coordination Unit on Eurostat data)

18-29 year-olds) showed that especially young NEETs often lack the basic digital skills required to access the programme and to use the CPIs' services, which are increasingly delivered through digital channels.

In the adult segment of the population, on the other hand, many people lost their job during the post-2008 economic crisis, and interviews with them show that many, especially those in their late 40s and older, have forgotten how to search for a job or have never done it before (the labour market in the past, especially in Emilia-Romagna, was very easy in this respect). Very often, they also lack the digital skills to access CPI services, to use online job search tools and to qualify for a new job.

The Emilia-Romagna regional government reacted to these challenges by launching the Pane e Internet digital literacy project in 2008 to fight the digital exclusion of older people and the adult population in general and, more recently, by supporting measures to fight digital skills gaps as part of active employment policies, co-funded by the European Social Fund (ESF). AECA has been a key actor in these initiatives, which used the DigComp framework as soon as it became available, to design and deliver basic digital training courses and other services.

Background to AECA

The Associazione Emiliano Romagnola di Centri Autonomi di Formazione Professionale (Association of Autonomous Vocational Training Centres of Emilia-Romagna), or AECA, was set up in 1973 under the initiative of a group of vocational training bodies that joined efforts to manage larger and more innovative projects devoted to young people, adults, women, foreigners and disabled people. Today, AECA encompasses 15 vocational organisations with 25 training centres, many of which have a long history. The AECA centres are in constant contact with the business world in order to understand and respond to their training needs and co-operate with over one thousand enterprises. As the leader of all these accredited bodies, AECA promotes youth policies and provides, among other things: design of intervention guidelines for VET providers, technical assistance and coordination of the activities of VET providers, and management, monitoring and evaluation for VET providers.

IMPLEMENTATION OF DIGCOMP

AECA has implemented three main projects in which DigComp was used, directly and indirectly, for training and other purposes. **Pane e Internet (PeI)** is the main one and used DigComp as early as 2013-14. The PeI model and the DigComp perspective inspired the courses for unemployed people organised in 2018 in collaboration with the CPIs, as part of a regional lifelong learning initiative. We also illustrate the **Digital Competence Development System (DCDS)** Erasmus+ KA3 project, inspired by Pane e Internet and fully based on DigComp.

DigComp in the Pane e Internet project (C1A)

Pane e Internet (PeI) is the main digital inclusion and competence development initiative in Emilia Romagna, financed by the regional government Regione Emilia-Romagna (RER) under the Regional Digital Agenda. It was launched in 2009-2010 as a pilot project that designed and tested a basic digital literacy training course inspired by the e-Citizen model. From 2011 to 2017, PeI was carried out by RER with implementation services provided by AECA together with Ismo and Simki, training and business services companies from Milan. After scaling up the delivery of the original PeI course and testing an experimental PeI-for-work module (see **TOOL 1**) from 2011 to 2013, in 2014 RER started developing a network of so-called PeI Points throughout the region. These are jointly set up with large and small Municipalities, to or ganise and deliver in cooperation with local libraries, schools, and private associations, three main activities: digital literacy training, e-facilitation services for peo ple at risk of digital exclusion, and digital culture events for the population at large. Today, there are 17 active PeI points throughout Emilia Romagna and over the years PeI has delivered about 1500 courses to 23,400 people with no/low digital skills: mostly mature adults (50+) and older people 60+ years old.

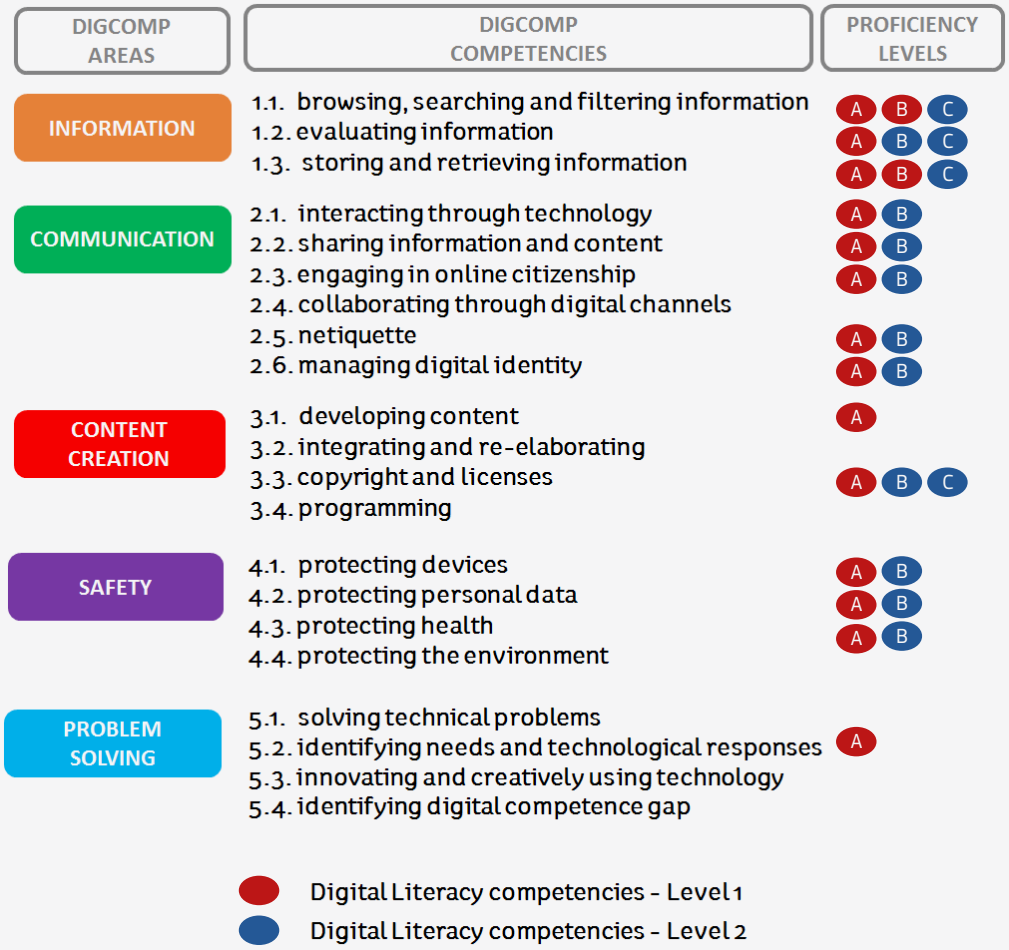
In 2013-14, once DigComp 1.0 was published, PeI training designers decided to revise the standard PeI course (which lasted 20 hours) and make it "DigComp-compliant". As illustrated in the DigComp into Action Guide, they first mapped the existing PeI digital literacy course onto DigComp's 5 areas and 21 competences. This process showed that many competences were already being addressed, but some, which were deemed important for the PeI target group, were not. Besides, the analysis of the three DigComp proficiency levels matched the need to articulate the new training offer into distinct courses: level 1 (20 hours, red bubbles in **F.6**) almost entirely focused on 14 DigComp competences at foundation level/A, and level 2 (16 hours plus an online self-study component, blue bub bles in **F.6**). The second course would lead learners to intermediate level/B in 8 of those competences and to advanced level/C in 4 of them.

The partial coverage of DigComp's full spectrum reflects two main factors: course duration constraints (about 20 hours for each level) and what could be reasonably expected from PeI's main target participants (adults and older people with low or no digital experience).

Besides the use of DigComp as a methodological tool to redesign existing training goals and outcomes, learn ing resources and activities, DigComp was used in PeI as a "knowledge tool" in the training of e-facilitators (mostly public library staff and volunteers), and later as a source of inspiration to identify relevant issues and content for the design of events and seminars of PeI Digital culture programme, aimed at stimulating citizens' curiosity about information society topics.

The informatica, inglese/English, industria - 3i project for unemployed people

Given the problems signalled by the CPIs about the low levels of digital skills of many customers, and the growing digital skilling demands on unemployed people stemming from the evolution of CPIs' own services (discussed above) and highlighted by labour market anal yses (Digital Competences Observatory Report



F.6 MAPPING OF PANE E INTERNET COURSES ONTO DIGCOMP (**C1A**)

2018), RER launched in 2018 the initiative "Life-long learning paths for unemployed people" (ESF-funded), focused on three competence areas: informatics, languages (Italian as a second language for foreigners and English for Italians), transversal competences and soft skills demanded by industry. The initiative, known as 3i from the Italian titles of three areas: informatica, inglese/ English, and industria, envisaged the collaboration of VET organisations with the CPIs to design and deliver training projects for unemployed people in these areas. Also in view of this initiative, RER organised with Ervet (the regional development agency, currently ART-ER) a technical seminar for the Emilia Romagna VET providers where DigComp was presented as a source of inspiration for the courses in the informatics area. Over 50 representatives of VET providers attended the seminar.

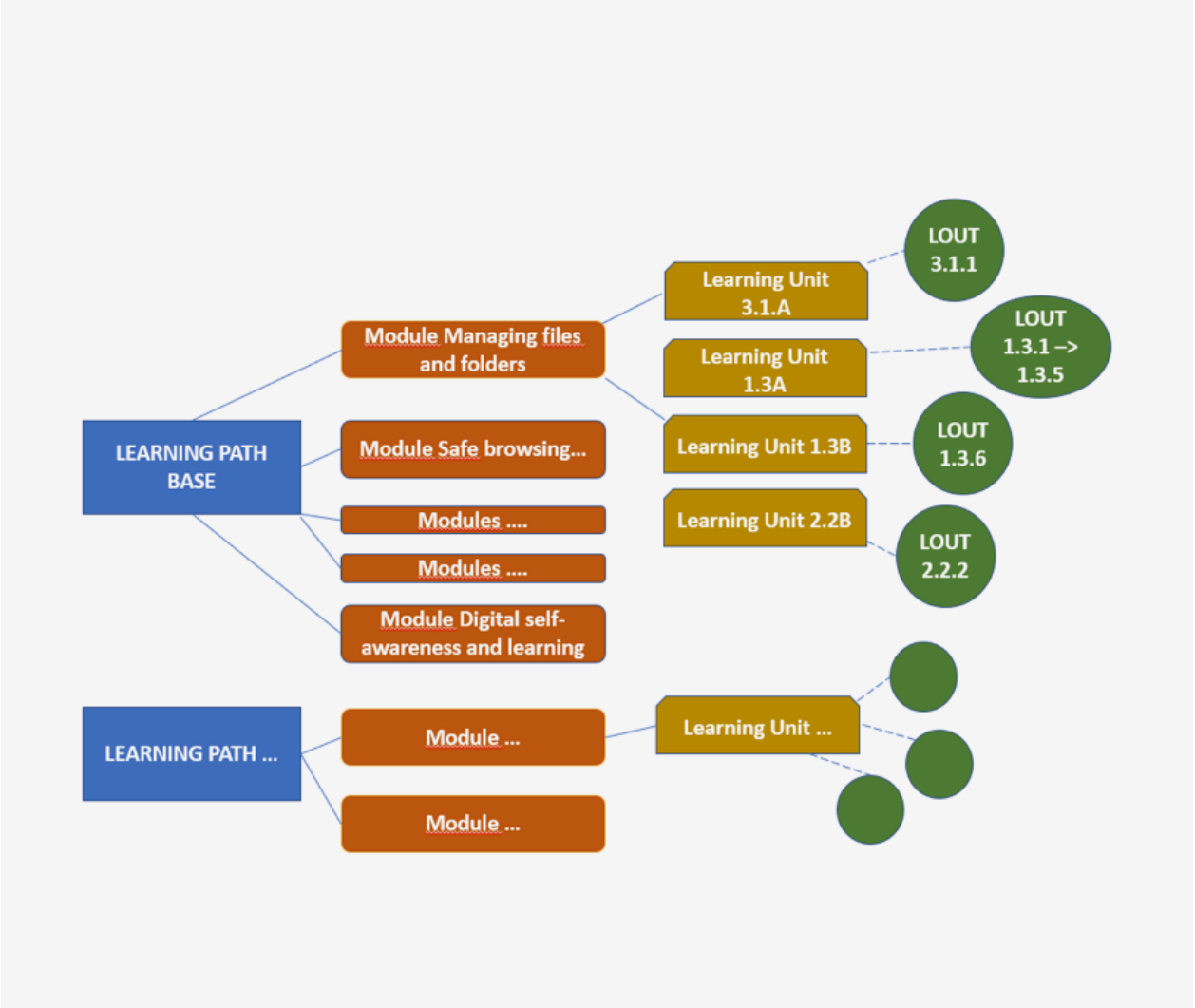
AECA coordinated the preparation of 3i project proposals with its associate members in the provinces of Bologna, Modena, Ravenna and Ferrara. DigComp was used in the training design process in three different ways. First, the PeI course level 1 content (see the green bubbles in **F.7**) and format (16 hours) were essentially replicated in the Digital literacy course and the related learning materials (all of them associated with DigComp competences) were made available to the trainees. Second, some follow-up courses (16 or 32 hours long) were inspired by DigComp competences, especially Tools for online storage, communication and sharing of digital content, Online communication and social networks for digital citizenship. Other follow-up courses (also 16 or 32 hours long) are ECDL-inspired (Basic informatics, Intermediate and Advanced Word and Excel) and one is on Graphics literacy for image

editing and presentations. Third, a simple entry questionnaire was designed to check the digital knowledge of the trainees, with nine questions associated with the five DigComp areas for those attending the Digital literacy course, and three additional ones for those going directly to the Basic informatics course.

The four AECA projects were approved and funded with a total €1.7M. Participants were identified and recruiTed through the local CPIs, and directly through AECA's own promotion channels. Over 200 courses on "informat ics competences" were delivered to about 2000 par ticipants by the end of January 2019 across the four provinces (almost 800 in Bologna alone). About 32% of trainees took the Digital literacy courses and the re mainder went to follow-up courses. 53% of participants in the Digital literacy courses are women, and 47% are men. Confirming the existence of serious digital exclu sion among unemployed people, about 50% of trainees in Bologna were digital illiterates who had never used a computer, 1 out of 5 of them (mostly people 35+ years old) had a secondary education or university degree.

DCDS: The Digital Competence Development System project (C1B)

DCDS is an Erasmus+ KA3 project coordinated by All Digital, which aims to raise the awareness of policy makers in partner countries (Belgium, Greece, Italy, Latvia, Romania and Spain) on digital inclusion challenges and opportunities, and to provide useful tools to address them. These are represented by a blended learning methodology, an online platform and a training offer implementing it, designed to train adults (25+ years old) in basic digital competence for work and



F.7 STRUCTURE OF DCDS TRAINING OFFER (**C1B**)

T.12 LIST OF LEARNING PATHS AND MODULES OF DCDS TRAINING OFFER (**C1B**)

Learning path: Base • Managing files and folders • Safe browsing and aware info search • Creating an account and using e-mail safely and correctly • Learning about public and private online service • Protecting devices, data, health and well-being • Basic ICT operations • Digital self-awareness and learning	**Learning path: Digital content creation** • Documents • Spreadsheets • Presentations • Photos and videos • Copyright and licences
Learning path: Communication and social media • Communication services • Social media • Copyright and licences	**Learning path: Explore ICT** • Programming • Environmental issues • Technical problems • New ICT tools

everyday necessities. As mentioned in the introduction, the DCDS target is the 40% of the European population with no or low digital skills. Pilots in five partner countries will test the DCDS approach and tools with different segments of this population, especially unemployed people.

As the proponents wanted to develop a DigComp-based training offer and Pane e Internet had already gained some experience in that, AECA was tasked with the design of the Digital competence development methodology (DCDM), within WP3 of the DCDS project. For AECA, and Pane e Internet, DCDS represents an opportunity to further revise the training offer according to the lat est DigComp 2.1 framework, and to experiment with a new training delivery mode (blended learning). DCDS uses a Moodle platform for a number of online learning activities and RER already uses an e-learning Moodle platform (called SELF) to train PeI e-facilitators, and for many other activities.

The DCDS project started in January 2018 and lasts 24 months. The first year was devoted to designing the DCDM, to developing a self-assessment tool to identify candidate learners' weaknesses in order to partially customise their learning path, and to producing the learning materials. The second year (ongoing) is devoted to developing and pilot testing the platform, the training approach and the content (pilots run from March to May 2019), and then to improving the DCDM and all the developed tools following on pilots' results.

DCDS is entirely based on DigComp, as the project proponents decided that the training offer should cover all five areas and 21 DigComp competences, at the moment, only at levels 1 and 2 of DigComp 2.1 (foundation level). The blended learning approach stems from the partners' experience in training adults with low digital skills, who are often, though not always, people with a weak educational background. With these learn ers, face-to-face teaching and peer interaction are very important, especially at the beginning of the learning process.

The training offer is structured at the basic level by learning units, which are assembled into modules, which in turn make up a learning path (see **F.7**). One learning path is called Base, it is compulsory and it covers about 2/3 of the total course duration. Learners can then choose a second (shorter) learning path from three options: Communication & Social media, Digital Content Creation and Explore ICT. In **T.12**, we provide the list of learning paths and modules designed for the DCDS pilots. The granularity of learning units, however, makes it possible to recombine them in different ways, according to the training organisation's priorities, the interests of learners and the desired training delivery duration.

Each Learning Unit addresses anything from one learn ing outcome (LOUT) to a maximum of three to four interrelated ones. Identifying and specifying performance-based learning outcomes has been the crucial structuring step of the whole DCDM. AECA, in collaboration with the partners, defined a total of 96 LOUTs

which are considered to be needed in order to achieve foundation level proficiency in all 21 competences. These LOUTs have been derived from analysis of several sources: the competence descriptors in DigComp Framework v1 and 2.1, the DESI human capital skills indicators, other DigComp implementations (identified using the DigComp into Action Guide), and a few other digital competence frameworks. Comparing these sources made it possible to identify the most frequent learning outcomes, those included in the DESI indicator, and others which looked relevant for inclusion and work purposes (DCDS ultimate concerns). The requirement was of course that the selected learning outcomes should be coherent with DigComp foundation level, but in a flexible way, so as to guarantee a meaningful learning experience.

In DCDS, thanks to the LOUTs which are always associated with a DigComp competence, the training offer is systematically related to the DigComp framework, but it does not necessarily correspond directly to it. This is because DigComp is structured by competences, whereas training content delivery in DCDS has been organised in a way which makes sense to the unskilled learner. For instance, when addressing the use of email services or social media, the learning modules include some LOUTs belonging to different competences in Area 2 Communication and collaboration (2.1 Interacting, 2.3 Sharing, but also 2.5 Netiquette and 2.6 Managing digital identity), and others related to 3.3 Copyright and licences (about respecting IPRs when sharing content) or to Area 4 Safety, e.g. to avoid opening suspicious email attachments. Thanks to the LOUT-DigComp competence link, DCDS will assess and validate learning achievements (through badges) at the level of modules and learning paths, but also at the level of DigComp competences, once all the LOUTs belonging to a given competence have been successfully achieved, in some cases across different modules or learning paths.

ONLINE RESOURCES

- Pane e Internet learning resources based on DigComp are organised into: Books, which introduce trainees to new concepts and terms; and Guided Practices, which explain specific operations to be done with a PC or tablet step by step. Guided practices are available only for PeI level 1 courses. These learning resources are free and available in Italian only. PeI is current ly revising and updating this material based on the LOUTs identified by the DCDS project.
- Measuring the Impact of Inclusion Actors (MIREIA): Impact Assessment Framework Main Report
- Digital Competence Development Methodology (DCDM) (at the time of writing this was the initial, pre-pilots version)
- DCDS Contents of the self-assessment tool

CONTACTS

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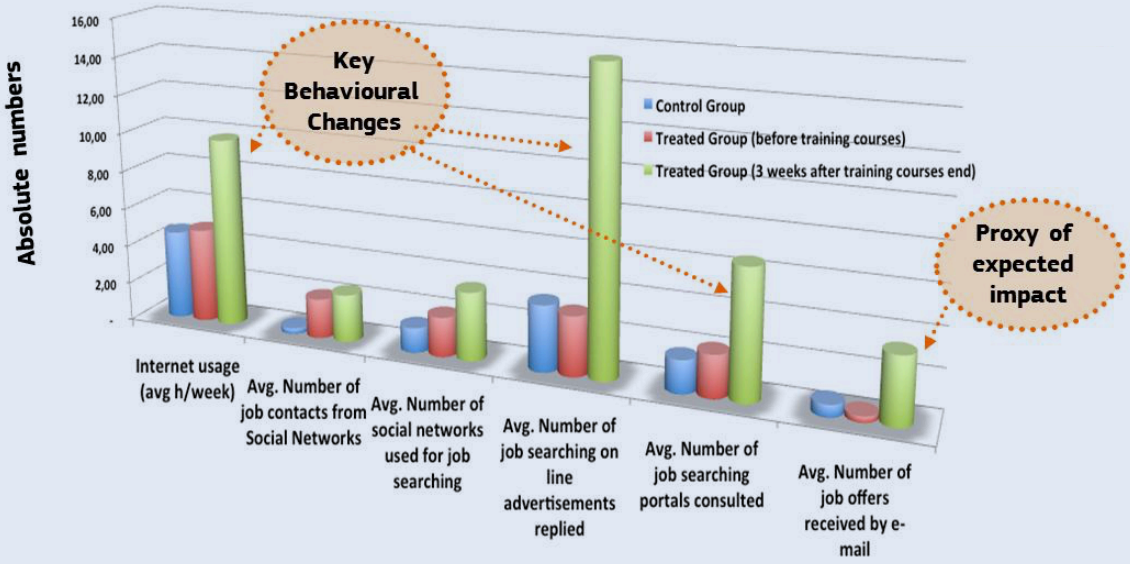
TOOL 1. Impact Assessment of Pane e Internet For Work Project (C1A)

In 2012, the Pane e Internet (PeI) project carried out an experimental training experience with young and adult unemployed people. PeI had received help requests from the managers of the Bologna Municipality's Employment Service and Parma Province CPIs to deal with many customers who had no or very limited digital skills. In response to this, AECA's project partner ISMO designed and tested, initially in Bologna, an additional PeI training module (called PeI-for-work) on how to use the internet for job searching, preparing and sending a CV and so on.

The PeI-for-work module was delivered through active job search labs lasting eight hours, with a standard introductory part followed by variable content, depending on the participants' prevailing interests: online job matching sites, private employment agencies' websites, job searching in public employment, vocational training websites, job applications on companies' websites, and how to consult and respond to online job advertisements. Participants (8-12 unemployed people per lab) had to already have some basic digital skills (knowing how to use a PC and email). Lab conductors (two per lab) were CPI orientation advisors with experience in specialist information delivery and job searching guidance. PeI trained them on the e-facilitation service approach.

Given the positive results of this trial, a broader experiment was carried out on the regional level in spring 2013: four courses were run at the Employment Offices of the Municipality of Bologna, nine courses at the CPIs of Parma Province and two courses at the CPIs of Rimini Province. The courses were attended by 150 participants in total (about 100 in Parma province alone).

The wider experiment included the testing of the impact assessment method based on randomised control trials (RCT) developed at JRC Seville (formerly IPTS) in the MIREIA project to measure the impact of eInclusion intermediaries' activities on their customers' employability. F.8 provides the frequency of adoption of different job searching methods by a control group of unemployed people who did not attend the PeI course (blue line), by the PeI-for-work course participants before taking the course (red line), and by the same group three weeks after the end of the course (green line). The figure shows that those who took the course significantly changed their job searching attitudes and practices, with such changes showing up after the end of the course. Course participants also started a snowball effect, by sharing their newly acquired knowledge with relatives and friends. Given these positive results, some of the organisations involved in the trials (in particular, the Parma Province CPIs) decided to continue these activities on their own, beyond the MIREIA project.



F.8 BEHAVIOURAL CHANGES IN ON-LINE JOB SEARCHING

TOOL 2. Entry questionnaire on digital competence for the 3i Digital literacy courses

The correct answer is in ***bold italic***; in brckets, the corresponding Digcomp area (when available).

1. When I switch on the computer, I end up

- ○ On Google
- ○ ***On the desktop*** (INFORMATION AREA)
- ○ In a personal folder
- ○ I don't know

2. Using Explorer I can

- ○ Write a document
- ○ Send an e-mail
- ○ ***Navigate on the Internet*** (INFORMATION AREA)
- ○ I don't know

3. When you hear about "font" and "style", it refers to

- ○ Internet
- ○ Editing images
- ○ ***Text document*** (CONTENT CREATION AREA)
- ○ I don't know

4. When you use an "online guide" you get

- ○ A better structured document
- ○ ***A manual in digital format*** (PROBLEM SOLVING AREA)
- ○ A safety alert
- ○ I don't know

5. Netiquette refers to:

- ○ Professional program
- ○ ***Good behaviour on the Internet*** (COMMUNICATION AREA)
- ○ E-mail
- ○ I don't know

6. In order to download a program on your PC

- ○ You use a cd rom
- ○ You open the "Manage files" program
- ○ ***You log into a web site*** (CONTENT CREATION AREA)
- ○ I don't know

7. In order to read an e-mail message

- ○ You open the "Documents" folder
- ○ You use a word processor
- ○ ***You go on the Internet*** (COMMUNICATION AREA)
- ○ I don't know

8. When you use an antivirus

- ○ You use a password
- ○ ***You protect the PC*** (SAFETY AREA)
- ○ You protect your e-mail
- ○ I don't know

9. In order to protect your personal data

- ○ When prompted, you reply to a safety alert
- ○ You buy only by using your credit card
- ○ ***There is no quick fix, you must pay attention and be cautious*** (SAFETY AREA)
- ○ I don't know

10. The word "cell" refers to

- ○ The computer memory
- ○ ***Microsoft Excel spreadsheet***
- ○ An adverts pop-up window
- ○ I don't know

11. In order to write a CV on you PC you use

- ○ Microsoft Excel
- ○ ***Microsoft Word***
- ○ Microsoft Publisher
- ○ I don't know

12. If you select the "print" command

- ○ You are using a photo application
- ○ ***The computer must be connected to the printer***
- ○ You change and select the printing rules
- ○ I don't know

C2

PRODIGEO

ITALY

The Prodigeo project was designed to enhance digital competence of staff working in public employment services in Italy (Centri per l'Impiego), for two main reasons: firstly, to help staff cope better with the increasing automation process that they are experiencing, both in the front and back offices, and secondly, to enhance their awareness of digital competence as an important employability factor for their customers, and their ability to contribute to its development.

Anpal Servizi, the operational arm of the Italian National Agency for Active Employment Policies, thus created the ProdiGeo eLearning platform and a 10-module training course on digital competence for the staff of public and private employment services. DigComp was used to identify the digital competence needs of the staff (and topics that might be relevant also for customers) and then to design the course organisation and content, in a well-structured and easy-to-maintain way.

The case in brief

Leading organisation	**Anpal Servizi**
Sector	Government
Start / end date	2015 - 2017
Geographical scope covered	National, Italy
Target audience	Employment services operators • NEETs • unemployed people
Professional sectors covered	Public and private employment services
Employee profiles covered	-
Stakeholders involved	Public and private employment services
Online resources	All Prodigeo training modules Anpal´s YouTube playlist (in italian) DigComp into Action Guide - see C8
Tools	Prodigeo Digital Competence course videos on YouTube
Contributors	Anpal Servizi, Prodigeo development team: Ivo Forni, Nicoletta Staccioli

LMI Skilling functions provided

(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓
Outreach to under / unemployed	
Careers advice	✓
Personal development plan	
Design and development of training	✓
Delivery of training	✓
Workforce development	
Assessment of skills	
Certification of competence	✓
Liaising with employers for job placement / experience	
Job search / support	✓
Client tracking and monitoring	
Employee support	

CONTEXT AND DRIVERS

The PROdotti DIGitali per l'Empowerment degli Operatori (Digital Products for Operator Empowerment), Pro. Dig.E.O.project (henceforth Prodigeo) was set up to address two challenges faced by employment services in Italy.

On the one hand, these services are increasingly digitised both in their back-office procedures and in their interaction with customers, with constantly-evolving and new ICT solutions. The staff working in these services are trained to learn the new procedures, and to use the related software applications. But Prodigeo's initiators at Anpal Servizi, who are among those designing and delivering such training (along with software solutions suppliers), saw that employment services operators found it difficult to cope with and make sense of this increasing automation process. They identified one important cause of this difficulty in the lack of a broader digital culture and understanding of the main transversal features of the ongoing digital transformation.

On the other hand, the official statistics about the low digital skill levels of the Italian population and the knowledge gathered through direct contact with employment services customers highlighted the opportunity/need to raise awareness among service operators of the increasing importance of digital competence as an employability factor, and in particular, the need to increase their understanding of the digital competence needs of their customers and their ability to contribute to developing such competence, e.g. by recommending digital training opportunities where available.

Both these challenges pointed to the idea of developing a large-scale training process focused on digital competence for the staff of public and private employment services. The development of the staff's digital competence in a new and different perspective from the traditional approach based on teaching software applications would facilitate the digital transformation process of employment services and have a positive "spillover" effect on the services' customers.

Anpal Servizi and the Prodigeo project

Anpal Servizi S.p.A., which was born from the transformation of the pre-existing Italia Lavoro by the labour market reform of 2015 known as the Jobs Act, is the operational arm of Anpal - Agenzia Nazionale Politiche Attive Lavoro, the national agency for active employment policies. Anpal depends on the Ministry of Labour and Social Policies, and supervises and cooperates with the employment services network in Italy, composed by regional agencies, and public job centres at provincial and sub-provincial level (called Centri per l'Impiego, CPIs, with 840 access points in 2017), and private employment services, estimated to involve 20,000 organisations (agencies of various types, private job consultants, professionals working in schools and universities and others) with 40,000 people.

Anpal Servizi is structured into three directorates named Knowledge (devoted to research, training and IT services), Transitions (from education to employment) and Labour services. Anpal Servizi runs projects (usually co-financed by the European Social Fund, ESF), to develop and deliver training, pilot initiatives and other support services involving primarily the approximately 8,000 staff of CPIs, but also private sector actors. Prodigeo is one of these ESF-funded projects promoted by the Italian Ministry of Labour and Social Policy.

The Prodigeo project was defined in 2013 under the National Programme for digital culture, training and competence, which is one of six strategic axes of the Italian Digital Agenda, launched by the Italian Digital Agency (AGID). This program prioritised the development of digital competence of all citizens, in public administration and in other areas. Thanks, among other things, to its choice of DigComp as a reference framework, it was approved by the Ministry of Labour and Social Policy in 2014, with a budget of €1.38m, and it was then implemented between 2015 and 2017.

The project developed an e-learning course with 10 modules, based on the DigComp framework, to deliver training on digital competence to the staff of public and private employment services throughout Italy. Prodigeo is also the name of the IT platform (based on Moodle) that was built during the project and is under the responsibility of the organisational unit of Anpal Servizi's Knowledge directorate in charge of platforms and eLearning, with a transversal support function also to the company's other directorates. Anpal Servizi has since been using the Prodigeo platform to deliver many other online courses to its customer base.

LMI skilling functions provided

With the decentralisation of public employment services at regional level, which started about 20 years ago, the range of services delivered by CPIs in Italy varies significantly. In 2018, for the first time, a Ministerial Decree (no. 4 of 11 January 2018) defined the common essential levels of performance (Lep) to be provided throughout the country by CPIs both to people seeking work and businesses. Before this development, the 8 service areas and related activities potentially of-

T.13 FUNCTIONAL AREAS OF CPIS IN ITALY AND THEIR MAIN ACTIONS

Reception and first information • User reception • Expletion of administrative practices • Insertion and/or updating of user data in information systems • Release of information on the services offered • Updating of information boards (physical and virtual)	**Level I orientation** • Identification of user needs • User profiling • Presentation of training and professional opportunities • Support to the drafting of the user's curriculum vitae • Addressing the user to specialist services • Definition of the individual service pact	**Level II guidance and skills balance sheet** • Planning of guidance/advice routes • Reconstruction of the socio-professional history of the customer • Identification and certification of competences • User support in acquiring information on professional, work and training opportunities • Interview and definition of the individual action plan • User guidance and support in the construction of a professional development project and related action plan	**Guidance to work – job matching** • Implementation of actions to prevent the risk of failure in transition phases • Implementation of active job search labs • Implementation of interventions to accompany work placement • Accompaniment and monitoring of individualised employment pathways - tutoring • Collection of curricula • Scouting job opportunities (matching) • Database management (data entry and updating)
Job placement for disadvantaged people • Analysis of the needs of disadvantaged people • Evaluation of the customer's professional potential • Support to the drafting of the customer's curriculum vitae • Selection and presentation of existing job opportunities • Support for insertion and re-entry into employment and related tutoring • Accompaniment (of the user and of the company) in the path of insertion and re-insertion	**Referral to Vocational Training** • Identification of the characteristics of previous learning (however acquired) • Identification of motivations and expectations for the training intervention • Assessment of the consistency of the competence endowment with the characteristics of the training intervention • Identification of criteria and tools for the verification of training credits • Evaluation and recognition of training credits • Identification of specific needs for the individualization and personalization of the training path • Preparation of a training project	**Business creation and self-employment** • Personalized assistance for the definition of the business creation/self-employment plan • Evaluation of the characteristics of the candidate and the project • Referral of the candidate to opportunities for meeting others and joint work (e.g. coworking) • Steering candidates towards concessional finance instruments to support entrepreneurship • Activation of additional accompanying services (e.g. mentoring, counselling and coaching) • Analysis and verification of the difficulties encountered by the new entrepreneur/self-employed person • Addressing of the new entrepreneur/ self-employed person to specific support services • Implementation of actions aimed at matching training demand and supply	**Business services** • Reception and assistance of companies in their search and management of employment legislation and service information • Expletion of administrative practices • Release of information on the services offered • Identification of the needs of the company • Supporting the drafting of staff requests • Identification of suitable applications (pre-selection) • Management of pre-selection/selection interviews • Recruitment of specialised and difficult to find professional figures

fered by CPIs in Italy are shown in **T.13**.

The actual services delivered by 90-99% of all CPIs in 2017 and the most common actions are listed below:

- **Customer reception and first information delivery** (including registration and updating of user data over time).
- **Level I orientation** (identification of user needs, definition of the individual service pact, presentation of training and professional opportunities, addressing the user to specialist services, support on drafting curriculum vitae, user profiling).
- **Guidance to work** – job matching (collection of curricula and database management).
- **Level II guidance and skills balance sheet** (information on professional, work and training opportunities).
- **Business services** (assistance to companies on employment legislation and service information, drafting of staff requests, identification of suitable applications (pre-selection)

The core actions carried out are highly standardised and primarily of an administrative nature, along with the provision of information on local professional and training opportunities and some support on curriculum preparation.

In practical terms, the first step for a person seeking work with a CPI is filling in the "declaration of immediate availability" (to work), called DID in Italian, online or with CPI staff support. This form collects basic information about the person and their study background, and confirms that he/she is currently out of work. Then, there is the profiling interview, during which the operator gathers some additional information about past work experiences, any current study activity etc. to produce an "employability score". The third step is the suggestion of further actions, which also depend on the previous score. The range of such actions varies significantly across CPIs.

The standard profiling form used in this process does not include questions on digital or any other skills (but some regional governments have introduced them), and little time is actually available to assess these aspects more deeply. Any information on the customer's ICT knowledge, if collected, can of course be used, but it is not a structured and standard procedure at the moment. Everything on this matter is entrusted to the CPI's operator initiative.

On the other hand, whereas digital training opportunities are offered by VET organisations in many regions (often with ESF-funded courses), there is in general no structured communication flow about them towards the CPIs, with a few exceptions. For instance, in Emilia Romagna the regional government systematically informs the CPIs about its digital literacy programme for the adult population, called Pane e Internet, and involves the CPIs in actively promoting the courses to their customers.

IMPLEMENTATION OF DIGCOMP

The Prodigeo project aimed to create a course on digital competence for employment services operators to be delivered online, so as to reach as many of them as possible. Besides catering for the needs of the operators, the course should address aspects that would also be relevant to their customers e.g. content about job searching through social media, online opportunities for learning and professional development and so on.

The first step was to identify training needs. This was done in late 2014, just before the formal start of the project, through 10 focus groups with CPI operators and managers organised in the North, Centre and South of Italy, and through interviews with Anpal's managers at central and regional level. In this process, Prodigeo's designers presented DigComp's new view of digital competence and its overall structure, and illustrated the self-assessment grid from DigComp v.1. These elements were used to frame and guide the discussion with focus group participants about their perceived digital competence strengths, weaknesses and needs. The novelty of DigComp at that time (e.g. Anpal Servizi had to translate the grid into Italian) and the lack of experience with it did not allow the Prodigeo team to make a deeper use of the framework in this initial step of the course design process. The DigComp concept, nevertheless, was understood and appreciated by CPIs operators and managers, who felt and expressed the need to enhance their digital competence, for themselves and potentially for the benefit of their customers. The latter's digital competence needs were not so clear to the focus group participants, but reflecting on the difficulties and failures of some new services and projects, training needs emerged, both with respect to older and younger generations. The age digital gap on internet use in Italy is severe, so problems with older people were expected. Among young people, it turned out, for instance, that ownership and/or use of the email was uncommon and its role to access online digital services poorly understood. Also, many young people felt uneasy with the idea of filling in their own online forms.

This confirmed the Prodigeo team's idea that developing the operators' digital competence could and should also have a spill over effect on the employment services' customers.

In the second step, the needs identified were mapped first onto the DigComp areas and then onto the specific competences, leading to identification of the areas and competences considered most significant for the target group. Focus group participants actually raised several topics which are not easily related to the DigComp framework – e.g. industry 4.0 and new digital jobs associated with business start-ups- which were included in the training programme (Module 10), but addressed simply with short "introductory pills".

In the third step, the target proficiency level to be achieved for each area and each individual competence (see **T.14**) was defined by analysing the different DigComp dimensions across proficiency levels, and by referring them to usage scenarios in the work environment of a CPI.

Two examples of how the above "double use" goal (for operators and their customers) of specific competences was understood and managed are the following. In the case of Prodigeo's Module 3 Information, operators face an increasing range of potentially useful online information sources about active employment policies and specific measures, job opportunities and many other topics. The training had to address how to assess the quality of the information found and the trustworthiness of the sources, and explain the logic behind the sequence of answers provided by search engines. But this knowledge is also important for CPI customers, so as to make them critically aware of online opportunities for job searching. Another example concerns the

T.14 PRODIGEO COURSE MODULES, DIGCOMP COMPETENCES AND LEVELS

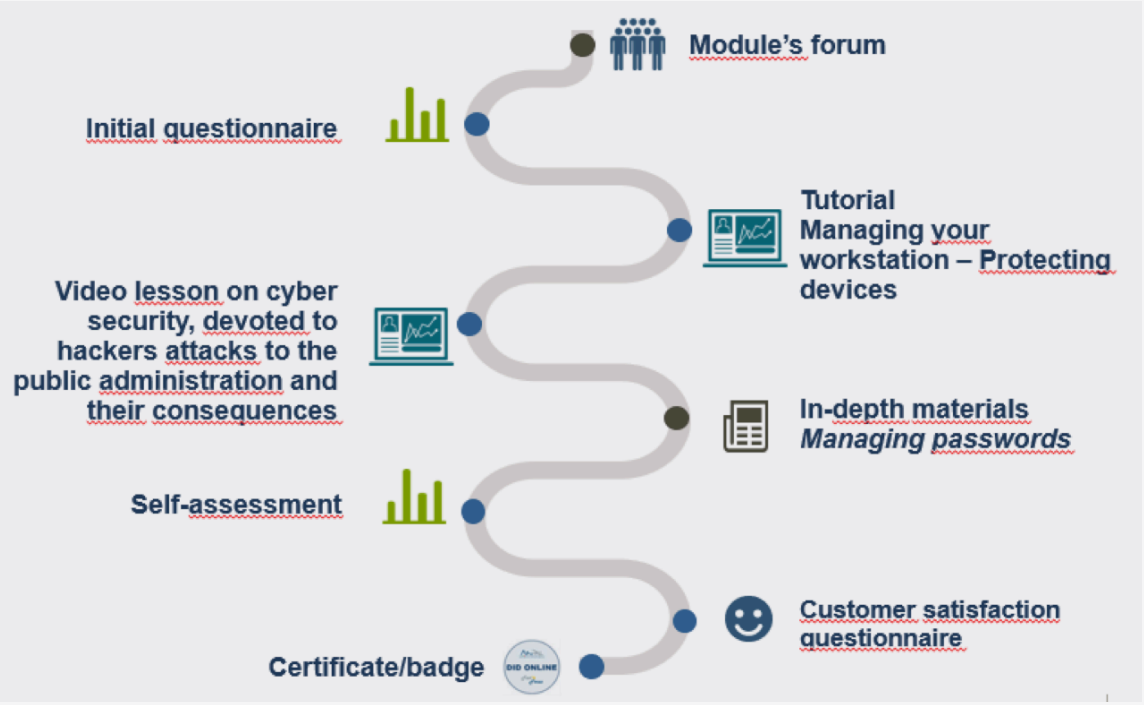
MODULE NAME	DIGCOMP COMPETENCE	PROFICIENCY
1. Problem solving	5.2 Identifying needs and technological responses	Intermediate
	5.4 Identifying digital competence gaps	Intermediate
2. Safety	4.1 Protecting devices	Foundation
	4.2 Protecting personal data and privacy	Intermediate
3. Information	1.1 Browsing, searching and filtering information	Intermediate
	1.2 Evaluating information	Advanced
	1.3 Managing information	Intermediate
4. Creating content	3.1 Developing digital content	Intermediate
	3.2 Integrating and re-elaborating digital content	Advanced
	3.3 Copyright & licences	Intermediate
5. Interacting through the new technologies	2.1 Interacting through the new technologies	Intermediate
6. Sharing information and content	2.2 Sharing information and content	Intermediate
7. Collaborating through digital channels	2.4 Collaborating through digital channels	Advanced
8. Engaging in online citizenship	2.3 Engaging in citizenship through digital technologies	Intermediate
9. Managing digital identity	2.6 Managing digital identity	Advanced
	2.5 Netiquette	Intermediate
10. Digital competences and entrepreneurship	5.3 Creatively using digital technology	Advanced

use of SPID identity. SPID (Sistema pubblico di identità digitale) is the unique login system to access the online services of the Italian public administration and private adherents. CPI operators must learn how to use SPID to access, for instance, the INPS Social Security portal, as requested by some service procedures. But knowing about and learning to use SPID has become a matter of digital citizenship in Italy, which is also relevant to CPI customers.

The last step in the Prodigeo process was designing and implementing training content, consistent with learning needs and target levels. Themes were aggregated into modules with the same structure (see **F.9**), designed to deal approximately with a similar number of topics and have similar duration of about 2 hours for the core part (entry test, two or more tutorials, a video lesson and a final test), plus a variable time for the study of supplementary in-depth material. Besides the online course, Prodigeo also designed a series of webinars to deepen and consolidate a number of course topics.

An important criterion in training content selection and production was to try to minimise its rapid obsolescence risk, which was addressed by avoiding focusing on specific software tools and instead focusing on services and access to them. This also met the Prodigeo designers' desire to address the debate on commercial vs. open-source software (which is being implemented at several CPIs), and to clarify that developing digital competence was an aim beyond the use of specific tools. The DigComp Framework's view facilitated all these choices.

Although each module can be studied and completed independently from the others, the recommended learning sequence to take the full online course with



F.9 STRUCTURE OF TRAINING MODULES (EXAMPLE OF SAFETY MODULE)

an appropriate didactic logic is summarised as follows: 1+8 -> 2+9 -> 6+7 -> 3+4 -> 5 -> 10.

The design of the Prodigeo digital competence course had to address the challenge of providing content which would make sense throughout Italy, even though the course customers, even within the national public CPI system, operate with different internal technical and organisational conditions and external local contexts. This was another reason for focusing on competences and not on specific software applications used in CPIs. DigComp technology neutrality and the general treatment of many topics proved particularly useful in coping with these requirements.

The digital competence training course was ready by January 2017, and was made available on the ANPAL Prodigeo platform, where, after registration, anybody could use it free of charge. The course could also be taken on mobile devices, as Prodigeo made use of responsive technologies which "adapt" the interface to different devices while providing the same educational content, and each training object was designed for rapid use on the move.

The large-scale promotion and delivery of the course among public and private employment services ultimately never took place. This was due to the implementation of the Jobs Act reform, the parallel launch of other important policies (e.g. the Reddito di Inclusione, REI anti-poverty inclusion income measure) and new services such as the mandatory DID online since Dec 2017 affecting unemployed people. All these changes shifted staff training priorities away from digital competence to other topics.

Nevertheless, users of the Prodigeo platform found out about the course and at the time of writing 910 of them (12% of total users) had enrolled in the Digital Competence Path in self-training.

After a temporary suspension in late 2019, all the Prodigeo training modules were transferred to the new MyLearning platform on Anpal website and are now openly available to any interested user."

ONLINE RESOURCES

- All Prodigeo training modules
- Anpal´s YouTube playlist, where all Prodigeo's videos are presented.
- DigComp into Action Guide - see C8

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TOOL 3. Prodigeo Digital Competence course videos on YouTube

DIGCOMP COMPETENCE AREA	DIGCOMP COMPETENCE	COURSE
1. Information and data literacy		Informazione digitale integrale
2. Communication and collaboration	2.1 Interacting	Interagire attraverso le tecnologie
	2.2 Sharing	Condivisione. Come sfruttare la condivisione.
		Condivisione. La condivisione su internet. Integrale.
	2.4 Collaborating	Collaborazione (parte 1). La qualità dei servizi della PA.
		Collaborazione (parte 2). Il design dei servizi della PA.
		Collaborazione (parte 3). Nuove soluzioni di collaborazione.
		Collaborazione (parte 4). I dati aperti.
		Collaborazione (parte 5). Come partecipare
3. Digital content creation		Sviluppo, integrazione, rielaborazione contenuti
4. Safety		Sicurezza informatica, Intro
		Sicurezza informatica. Versione integrale
		Sicurezza informatica, Pubblica Amministrazione
5. Problem solving		Problem solving, versione integrale
		Problem solving e imprenditorialità – intro
		Tecnica, abilità, competenze. Video introduttivo al modulo formativo “Competenze digitali: problem solving e competenze digitali”
		La trasformazione digitale. Video introduttivo al modulo formativo “Competenze digitali: problem solving e competenze digitali”
Other		Trasformazione della PA
		Il processo formativo

C3 IKANOS

SPAIN

The Basque Country Government launched the Ikanos project in 2012 to create a learning support infrastructure for the digital competence needs of citizens, enterprises, civil servants, and others. DigComp was chosen from the beginning as the reference framework for all Ikanos actions, which are now enabling widespread digital transformation in the Basque Country.

Ikanos used DigComp to develop a set of tools: a self-assessment test (used by over 50,000 citizens) for career and training guidance and to improve the personal skills and employability of unemployed people, 15 Professional Digital Profiles, the Ikanos Personal Learning Environment to support continuous development of digital competence, and the new digital competence certification system BAIT (see **C8**).

Ikanos shows DigComp potential, once adopted in a systemic way, to create "interoperable" resources and services which enhance both citizens' employability and the digital transformation of the business sector and public administration.

The case in brief

Leading organisation	**Ikanos**
Sector	Government
Start / end date	2012 - Ongoing
Geographical scope covered	Regional, Basque Country, Spain
Target audience	Employed • Unemployed • Generic population
Professional sectors covered	-
Employee profiles covered	15 profiles (see **T.15**)
Stakeholders involved	Public administration • University • Private companies (manufacturing and other sectors) • Public and private employment services
Online resources	Standard Ikanos self-assessment test (SAT) Professional digital profiles (in Spanish only) Guide for professional digital profiling Ikanos Personal Learning Environment (PLE) DigComp into Action Guide - see C2, T2, T3, T4
Tools	4. Ikanos Digital Competence Professional Profiles
Contributors	Ikanos project - Ana Isabel Vitorica Leoz, Director Ibermática - Roberto Lejarzegi, Consultant

LMI skilling functions provided

(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓
Outreach to under/ unemployed	✓
Careers advice	✓
Personal development plan	✓
Design and development of training	✓
Delivery of training	✓
Workforce development	✓
Assessment of skills	✓
Certification of competence	
Liaising with employers for job placement / experience	
Job search support	
Client tracking and monitoring	✓
Employee support	

CONTEXT AND DRIVERS

As part of its Agenda Digital de Euskadi 2015 (AD@15), the Basque Country Government decided to establish a "learning support infrastructure" to promote and facilitate continuous development of digital competence as a key driver for the innovation and competitiveness of the Basque country. Many ICT training initiatives were already underway at that time in different parts of the local society and economy, and the goal was to incorporate and further develop them into a comprehensive and coherent system which would start with the assessment of citizens' digital competence and then support orientation, training and certification processes with a range of interconnected tools and services.

The Ikanos project was therefore launched in 2012 to create such learning support infrastructure and to address both the common and specific digital competence needs of citizens, enterprises, civil servants, teachers and other segments of Basque society. When DigComp was published, it was immediately adopted for the Ikanos project, as an authoritative, transversal and flexible digital competence framework that could act as a scaffold for the whole process.

The Ikanos project

The Basque Government Directorate of Entrepreneurship, Innovation and Information Society at the Department of Economic Development and Infrastructure has been in charge of the Ikanos project from the very start.

Initially, Ikanos focused mainly on the public sector, with milestones including:

- mapping experiences with the evaluation and certi-

		people	organisations	global
	1. Digcomp framework ikanos site	✓	✓	✓
	2. ikanos self-assessment Test	✓		
	3. Personal Digital Profile report	✓		
	4. Digital Organizational Profile		✓	
	5. Professional Digital Profile		✓	
	6. Definition of objectives	✓	✓	
	7. Professional Digital Profile Management		✓	
	8. Results analysis tool		✓	
	9. Organizational Diagnosis Report		✓	✓
	10. Orientation Guide		✓	
	11. Resource Cataloguing	✓	✓	✓
	12. PLE configuration	✓	✓	✓
	13. e-Portfolio construction	✓		
	16. BAIT Digital Skills Certification			

F.10 AREAS OF IKANOS ACTIVITY

T.15 IKANOS PROFESSIONAL DIGITAL PROFILES (2018)	
PROFESSIONAL DIGITAL PROFILE	SOURCE/PARTNER
Administrative Staff (In Public And Private Organisations)	Mondragon Univ. – Ikanos
Machine Operator	Ikanos
Sales Representative	Ikanos
Entrepreneur	Ikanos
Industrial Machinery Operator And Numerical Control Programmer	TolosaldeaLHII
Advanced Manufacturing Maintenance Technician	Mondragon Univ.
3d Designer For Additive Manufacturing	I.m.h. Hirudi3D
Additive Manufacturing Machinery Operator	I.m.h. Hirudi3D
Robotics Technician	Mondragon Univ.
Sme Digital Transformation Manager	ASLE
Manufacturing Line Operation Technician	Aernnova
Consultant On Services And Programs For The Third Sector	EDE Taldea
Economist - Business Manager	Ekonomistak
Economist - Consultant	Ekonomistak
Economist - Specialist In Digital Marketing	Ekonomistak

fication of digital competence in Spain and Europe;

- developing a self-assessment test (SAT) of digital competence for citizens and a Guide for intermediaries on using the results of the test for training and employment orientation purposes;
- defining four Professional Digital Profiles (PDPs, the first four in **T.15**);
- organising thematic workshops with stakeholders from across Basque society;
- disseminating the project at national and European level.

In the current (second) phase of the project, given the strong emphasis of the 2015-2020 Basque Digital Agenda on public-private collaboration, Ikanos´ main aim has been to make digital competence development the driving transversal and structural element of formal education and lifelong learning, of employment plans and of the Industry 4.0 strategy in the Basque country.

In the field of education, following its effective use in testing students' digital competence in schools, DigComp has been adopted as the main digital reference framework for the new Basque education syllabus HEZIBERRI 2020. TKNIKA, the institution in charge of support and innovation for vocational education and training organisations in the Basque Country, has been revising its training pedagogy, and has been using DigComp Org in this context.

To achieve this overarching goal, Ikanos has carried out many actions summarized in **F.10**, including the following ones which are relevant to this study:

1. the standard format of the Ikanos SAT was improved and several different versions developed to take account of specific professional profiles, where 70% of the questions are specific to the job;
2. 11 new PDPs (especially for the Basque industry 4.0 strategy) were designed and added to the original four profiles (see **T.15**). This work was done in collaboration with Mondragon University, manufacturing companies and other stakeholders (see **TOOL 4**);
3. the Orientation Guide for intermediaries was also updated. The Guide explains how to use results from the Ikanos SAT to help customers choose/design effective learning paths towards selected job profiles;
4. the new digital competence certification system of the Basque country called BAIT was designed, tested extensively and brought into operation in autumn 2018 (see **C8A** BAIT).

Ikanos' focus has already shifted significantly towards supporting the digital transformation of the Basque economy, by working with enterprises involved in it and by strengthening citizens' digital competence development for employability from a lifelong learning perspective. This evolution will be reinforced in the next project phase.

Turning to the world of business, Ikanos plans to launch many pilots with enterprises, local Chambers of Commerce and other stakeholders, in order to test and adapt its assessment tools and PDPs in different Basque industries. Results from this ground-level practice will be engineered into off-the-shelf solutions as these become more mainstream. In order to facilitate a more bottom-up and business-driven process, successful digital transformation cases will be made highly visible, to encourage other enterprises to imitate them.

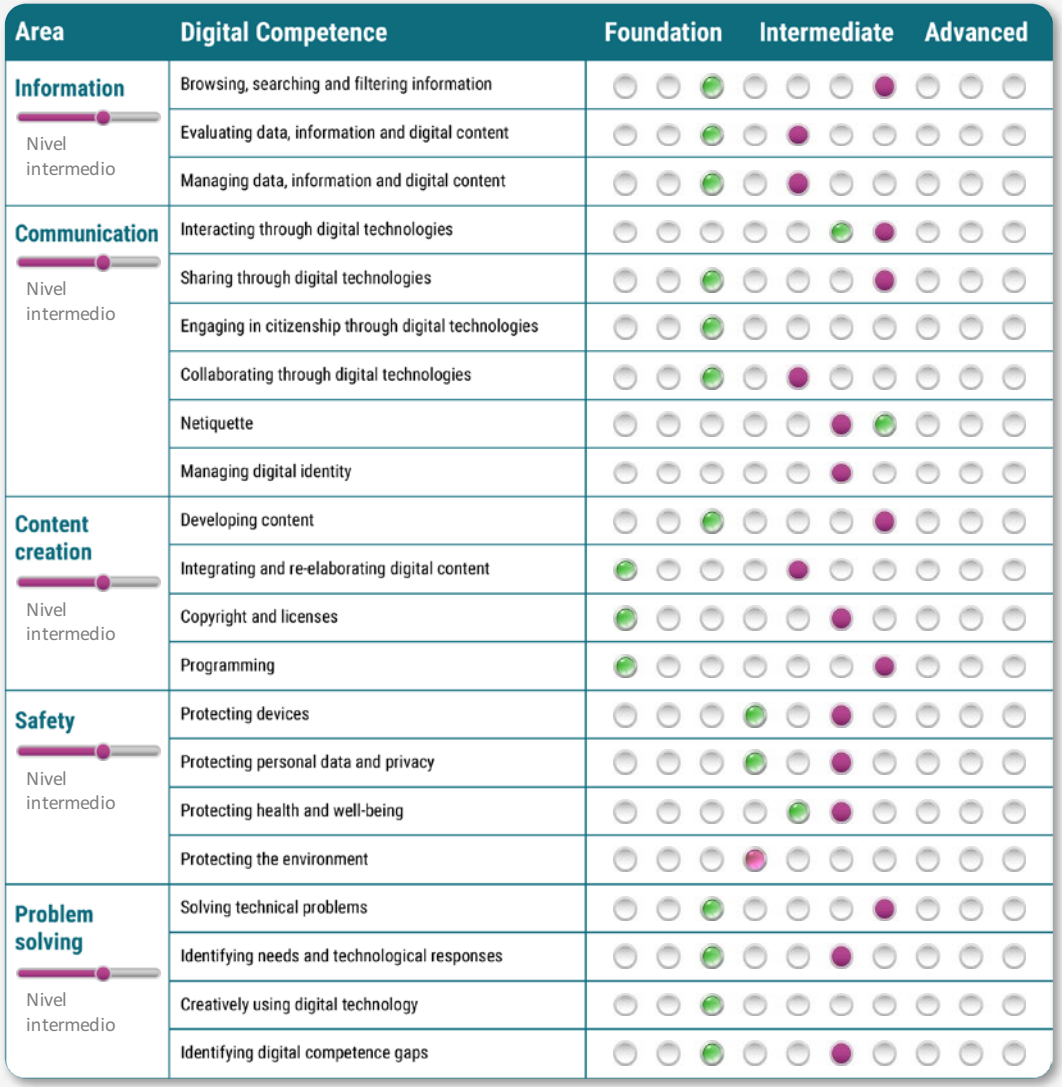
The development of benchmarking services on digital competence across business sectors and functions (for which there is already high demand) will be part of this process. The idea is to measure a company profile and compare it to the industry average, or that of its direct competitors, or the market leaders. An online community of Ikanos practitioners will be promoted, in order to enhance the exchange of experiences. DigComp will continue to be the reference framework used to describe the competence side of digital transformation for both benchmarking services and the online community of Ikanos practitioners.

As for developing citizens' digital competence to enhance employability from a lifelong learning perspective, Ikanos plans to spread the use of the Orientation Guide more widely and consolidate it among intermediaries, and to develop the Ikanos Personal Learning Environment. Both should support citizens in their digital learning journey.

IMPLEMENTATION OF DIGCOMP

Ikanos activities and tools have used DigComp systematically from the very beginning, establishing it as the reference framework for all those wishing to develop digital competence in all kinds of domains within the Basque Country. These include integrating unemployed people into the labour market, promoting self-employment and entrepreneurship, and reskilling and upskilling employees in public and private organisations.

TThe Ikanos SAT and the **Professional Digital Profiles** are key tools in these processes and both have been developed starting from DigComp areas, 21 com-



Personal report with objectives: to compare user results with the expected values.
Target values in green, are taken from the professional digital profile.
Personal results in purple come from the answers to the test.

F.11 IKANOS TRAINING DESIGN AND EMPLOYMENT ORIENTATION PROCESS

petence descriptions and three proficiency levels. The DigComp into Action Guide's tools T2 (p. 121) and T3 (p. 122) illustrate how this was done. A revised/updated description of the Ikanos PDP approach is provided in **TOOL 4** to this chapter.

Using a common framework has made it possible to compare the results of the Ikanos test with the digital competence requirements of occupations which are in high demand in the local labour market (which Ikanos is informed of by companies), or with staff competence development targets set by (public and private) employers, in order to identify and suggest learning paths towards those goals. This is done with the support of the Orientation Guide for Intermediaries illustrated below.

The Orientation Guide for Intermediaries

The Orientation Guide for Intermediaries is an internal working tool that explains how to compare the PDP for a given occupation with a customer's Ikanos test results, in order to identify the main competence gaps faced by the user and the training which is available to fill those gaps (see **F.11** and **F.12**). The Guide also suggests how to explain this operation to the customer, to ask a few additional questions and to make recommendations based on the results.

The training priorities suggested to the customer are identified by matching the results in the personal profile with the expected proficiency level for the core competences required for the selected occupation (see **TOOL 4**). As in **F.11** and **F.12** the advisor highlights the resulting gaps in the personal profile, and recommends that the largest ones be addressed first, through available training or another learning strategy.

Ikanos Orientation Guide is a **tool** for **professional guidance counselors:**

- To verify test results
- To go further in digital diagnosis
- To compare test results with professional profiles that match candidate skills

Competence **1.3 Storing and retrieving information:** Store information and content to facilitate retrieval and organize information and data.

The user has obtained his score in this competence by rating:

- His/her methods and habits of storing information, on physical media and in the cloud
- The way in which you classify and archive information.
- How quickly it locates and retrieves stored information..

We need to verify that the user:

- Understands how information is stored on different devices and services.
- Knows different storage media options and is able to select the most appropriate one.
- Is able to use information management services, programs and applications.
- Structures and classifies information and contents according to one or several classification methods.
- Uploads and classifies information and digital content and accesses and retrieves stored information.
- Is capable of tagging content.

Other questions related to storing and retrieving information:

- How do you back up your files? What storage hardware or service do you use?
- How is your naming strategy for folders and files?

Other questions about Cloud Skills:

- Do you know how to use Dropbox? Evernote, Pocket? OneDrive or Google Drive?
- Do you have a strategy for tagging new elements?
- Do you know how to synchronize bookmarks from your browser on another computer?
- When using social bookmarks (Delicious or Diigo) the categorization and use of tags is fundamental. Do you know any of these services? What do you think of them?

F.12 THE ORIENTATION PROCESS

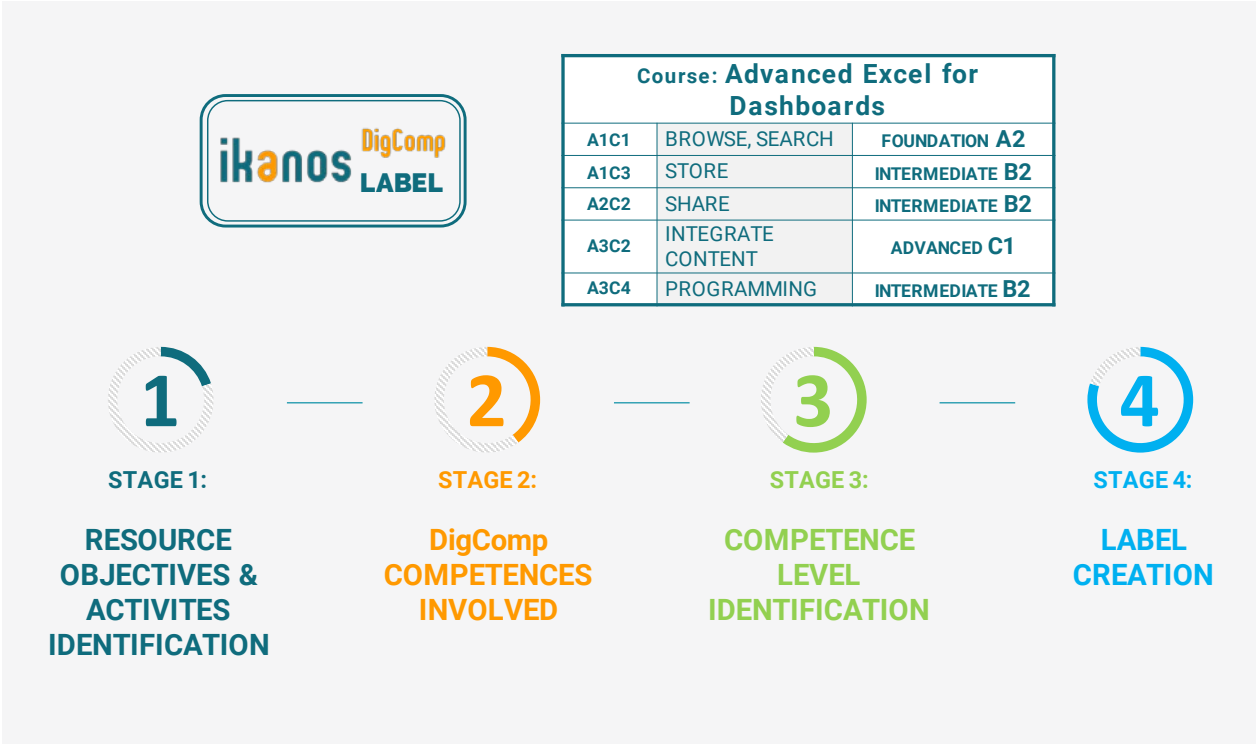
To support the use of the Guide, and in view of the development of the Ikanos Personal Learning Environment, DigComp has been used to classify all the ICT-related courses and learning materials offered by KZgunea and the Basque government's Industry Dept. via SPRI, the Basque regional development agency and its Enpresa and Mikroenpresa Digitala training itineraries. For instance, **F.13** illustrates this process where a specific course is classified as leading to a foundational level of proficiency of the DigComp competence 1.1 Browsing and searching data; to intermediate level of 1.3 Storing and retrieving information; 2.2 Sharing information and content and 3.4 Programming; and to advanced level of 3.2 Integrating and re-elaborating content. Therefore, the course will be recommended to a customer who needs or wants to improve these digital competences to the specified levels. A searchable list of learning resources has been produced according-

ly, with information about targeted competences and levels, course duration and delivery mode (online, with a tutor etc.). Based on this experience, Ikanos is developing a Guide to classify training content following the DigComp framework, to be used by digital training providers in the Basque Country. As a result of this work, an "Ikanos label" has been created to express the competence levels that can be acquired with that particular training resource.

The Anezka programme and the Ikanos Personal Learning Environment

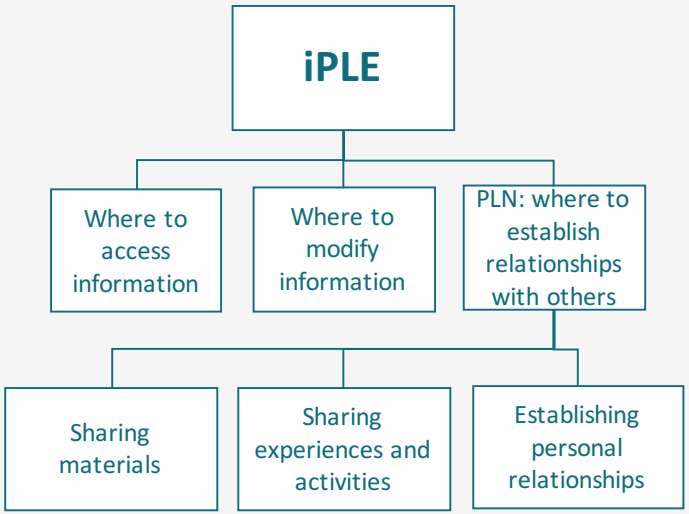
The latest Ikanos action from the lifelong learning for employment perspective is the collaboration started in October 2018 with DEMA, the Foral Agency of Employment and Entrepreneurship of the Department of Employment, Social Inclusion and Equality of the Basque government, which organises the Prestik Employment Fair held every two years in Bizkaia.

The collaboration concerns the Anezka-Lanzaderas de Empleo programme, which aims to improve the personal skills and employability of unemployed people, supporting them in the process of entering the labour market. A lanzadera de empleo (employment shuttle, in English) is a heterogeneous team of unemployed people who organise themselves with the support of a coordinator-counsellor to join forces in their search for employment and self-employment, exploring the different ways of integrating themselves into the labour market. Participants to the programme tend to be between their late twenties and their fifties, and have a good educational and/or professional background (typically in non-STEM areas), but are weak in digital skills. Some lost their job due to the economic crisis, while others want to move into an occupation for which they do not have the requisite skills. In the past three years, the 17 groups who have participated in the Anezka programme have achieved a labour market entry rate of more than 50%.



F.13 MAPPING COURSE CONTENT TO DIGITAL COMPETENCES

The 2018-19 programme involved 80 people, who worked in teams of 20 in five-hour sessions, three days a week for five months, to increase their chances of finding a job. The programme includes workshops, project work, and training pills on emotional intelligence, communications dynamics, personal branding and job searching on social media, job interviews, employability maps and other topics designed to improve employability, personalised sessions with a counsellor, direct contact with companies and human resources managers, participation in forums, meetings and events, entrepreneurship workshops and practical labs for participants with a business idea.



F.14 ACTIVITIES TO BUILD AND DEVELOP THE IPLE

When DEMA became aware of Ikanos' approach and tools, they agreed to collaborate and start using the Ikanos SAT and digital profiles in the Anezka programme. On the one hand, the Anezka counsellors were trained on the Ikanos test and the Orientation Guide. All participants in Anezka took the test and got the Ikanos digital profile resulting from it. Based on it and their employment interests, participants then worked with the programme's counsellors to discuss and design their target Professional Digital Profile and learning priorities. The programme offers training opportunities on using tools and services such as Excel and Google Drive to share information online. Beyond this, Ikanos aims to take this opportunity to start collaborating with DEMA to implement the Personal Learning Environment approach, which broadens learning opportunities to match what is on offer in the online world, and supports a continuous learning perspective. The plan is to test the whole range of tools to teach courses, rubrics, checklists, procedures, and available learning material that were designed for the iPLE some time ago. **F.14** illustrates the activities which are envisaged to create the Ikanos Personal Learning Environment.

ONLINE RESOURCES

- The standard Ikanos self-assessment test (SAT) is available in Euskara, Spanish and English.
- The following professional digital profiles are available in Spanish only. General profiles: Técnico Administrativo; Operador maquinaria; Comercial; Emprendedor. Industry 4.0 profiles: Técnico en Mecatrónica; Técnico de Mantenimiento; Técnico en CNC; Diseñador para Fabricación Aditiva; Operador de maquinaria de Fabricación Aditiva; Técnico en Transformación digital PyMe.
- The Guide for professional digital profiling is an aid to conducting the interview with experts in some occupation. It includes on a single page for each competence all the descriptors of DigComp versions 1 and 2, so that the interviewer can more easily mention the examples that appear in the guide and ask if those knowledge and skills are relevant in the given occupation.
- On the Ikanos Personal Learning Environment (PLE), one can find many documents (in Spanish) In particular: PLE para para el aprendizaje en organizaciones y en comunidades de aprendizaje; PLE para el aprendizaje a lo largo de la vida (Life long learning); Teorías del aprendizaje para sustentar el uso de PLE.
- DigComp into Action Guide - see C2, T2, T3, T4

CONTACTS

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TOOL 4. 1/2 - IKANOS PROFESSIONAL DIGITAL COMPETENCE PROFILES

Área	Competencia	Básico A1	Básico A2	Intermedio B1	Intermedio B2	Avanzado C1	Avanzado C2	Experto D1	Experto D2
Información	1.1 Navegar, buscar y filtrar la información	○	○	○	○	●	○	○	○
	1.1.1 Utilizar servicios de información clínica internos	○	○	○	○	●	○	○	○
	1.1.2 Utilizar servicios de información clínica externos	○	○	○	○	●	○	○	○
	1.2 Evaluar la información	○	○	○	○	●	○	○	○
	1.2.1 Valorar la calidad de la información clínica (PILAR)	○	○	○	○	●	○	○	○
	1.2.1 Valorar Apps de pacientes	○	○	○	●	○	○	○	○
	1.3 Almacenar y recuperar la información	○	○	○	○	●	○	○	○
	1.3.1 Conocer y mantener Sistema de Gestión Integrado	○	○	○	○	●	○	○	○
	1.3.2 Ordenar y borrar versiones de documentos	○	○	●	○	○	○	○	○
	1.3.3 Curación de contenidos	○	○	○	●	○	○	○	○
Comunicación	2.1 Interactuar mediante tecnologías	○	○	○	●	○	○	○	○
	2.2.1 Hacer videoconferencias con Lync	○	○	○	●	○	○	○	○
	2.2 Compartir información y contenidos	○	○	○	●	○	○	○	○
	2.2.1 Compartir documentos mediante Osabox	○	○	○	○	●	○	○	○
	2.2.2 Utilizar Osabegi para compartir información	○	○	●	○	○	○	○	○
	2.3 Participación en línea								
	2.4 Colaborar a través de canales digitales	○	○	○	●	○	○	○	○
	2.4.1 Gestionar conocimiento mediante Jakinsarea	○	○	●	○	○	○	○	○
	2.4.2 Colaborar en proyectos mediante Osagune	○	○	○	●	○	○	○	○
	2.4.3. Incrementar la relación online con los pacientes	○	○	●	○	○	○	○	○
	2.5 Netiquette	○	○	●	○	○	○	○	○
	2.6 Gestionar la identidad digital	●	○	○	○	○	○	○	○
Creación de Contenido	3.1Desarrollo de contenidos	○	○	○	●	○	○	○	○
	3.2 Integración y Reelaboración de Contenidos	○	○	○	●	○	○	○	○
	3.3 Copyright y Licencias	○	●	○	○	○	○	○	○
	3.4 Programación	○	●	○	○	○	○	○	○
Seguridad	4.1 Protección de los dispositivos	○	●	○	○	○	○	○	○
	4.2 Protección de datos personales	○	●	○	○	○	○	○	○
	4.3 Protección de la salud	○	●	○	○	○	○	○	○
	4.4 Protección del entorno	○	●	○	○	○	○	○	○
Solución de Problemas	5.1 Resolver problemas técnicos	○	●	○	○	○	○	○	○
	5.2 Identificar necesidades y resp. tecnológicas	○	●	○	○	○	○	○	○
	5.3 Innovación y uso creativo de la tecnología								
	5.4 Identificar brechas en la competencia digital	○	●	○	○	○	○	○	○

● Competencias Centrales ● Competencias Transversales ● Competencias Complementarias

F.15 DIGITAL PROFESSIONAL PROFILE: PRIMARY CARE HEALTH PROFESSIONALS

A professional competence profile defines the behaviours, skills and abilities which contribute to labour performance in a given occupation. Such a profile can be used to assess the potential and suitability of a given individual for a job, to detect training needs and define training plans, and to evaluate work performance. From Ikanos' perspective, a "professional digital competence profile" (PDP) specifies the digital knowledge, skills and attitudes that a professional must possess in order to adequately perform the tasks that require the use of digital tools and applications in a given job or occupation category.

The Ikanos approach uses DigComp (areas, competences, three proficiency levels and related learning outcomes) as the reference framework for defining PDPs which are appropriate for the Basque context. In the Ikanos approach, DigComp competences for any given occupation are also classified into three categories, depending on their relevance for the given job:

- **transversal**, digital competences which are common to all ICT-based work in the sector;
- **core**, digital competences which are mandatory for the activities associated with the given job;
- **complementary**, digital competences that are helpful and enhance work performance, but are not strictly necessary to do the job.

To define a PDP, Ikanos experts first describe all the main activities performed in the job in question, reflecting different levels of experience and proficiency and identifying critical tasks from the point of view of work output.

In the second step, they identify which activities can be performed using digital tools (at a later stage, hardware and software options are also specified). These digital activities are then associated with DigComp competences and proficiency levels. In turn, the selected competences are classified according to Ikanos' three categories (transversal, core, and complementary, as reflected in the colours of the bullets in **F.15**). As the blank lines in **F.15** show, show, not all DigComp competences are necessarily used in every profile, because the job in question may not require those specific competences.

Later on, interviews are run with experts (professionals in the field, human resources managers, vocational training specialists and others) in order to identify in more detail the digital aspects of job tasks and to specify the competence de-

TOOL 4. 2/2

scriptors, depending on the technical solutions used in the selected job. Specifications which are usually not found in DigComp descriptors are illustrated in a sheet called "Aspects of the job's digital competence". As a result, the same competence may have different descriptions, depending on the prevailing tasks in different occupations. Over time, these specifications are collected and shared among experts to inspire and support the design of new PDPs.

Besides such variation in the description of competences, Ikanos created the concept of "**sub-competence**" in order to facilitate the use of DigComp in the business world. A sub-competence is identified and described when some relevant and specific work tasks, and related digital competence, characterise an activity and need to be highlighted in the professional profile. A sub-competence complements a DigComp competence, and is positioned under it by analogy, or because it emerges as a very relevant element when asking about a particular competence in the occupation being examined.

An example of the analogy association concerns maintenance technicians operating in large advanced factories, who must be able to produce multimedia material with a mobile device in order to document a failure in a machine and possible repairs. Producing good explanations and quality images of a breakdown and the repair process may save a lot of time and money if the failure happens again. This competence has been identified as a sub-competence called "Using visual resources to document and record interventions, explain procedures and give instructions", belonging to DigComp 3.1 Developing digital content.

An example of the association by specification concerns the 3D designer of additive manufacturing. Questions about the importance and character of DigComp competence 3.4 Programming in this occupation revealed three sub-competences:

- 3.4.1 *Use macros to automate tasks in commercial 3D design software packages* (the designer does not use a standard programming language, but must learn the macro language from his design program);
- 3.4.2 I*ntegrate additive manufacturing plug-ins into commercial software packages* (new additive manufacturing plug-ins are released continuously, and they can dramatically improve productivity. It is necessary to monitor what is published and know how to install new plug-ins);
- 3.4.3 *Define work orders to specify the machine's operating mode* (i.e. the specific way in which a part has to be printed).

Other industrial digital sub-competencies have been identified in the following areas: monitoring technological advances linked to lifelong learning and the Personal Learning Environment, information management methodologies such as "Digital 5S", 3D design aspects of advanced CNC and Additive Manufacturing (see above), installing and configuring industrial networks and electronics linked to machinery, and solving technical problems in the operation of Additive Manufacturing machines.

The above activities relating to PDPs are carried out in close cooperation with the main stakeholders that are part of the Basque Industry 4.0 initiative: Mondragon University, IMH, 3DBide, Tecnalia, as well as large companies like AERnnova in the aeronautical industry. The collaboration has subsequently been extended to include the Basque Economists' College Ekonomistak, and other organisations.

C4 ECCC DIGCOMP CERTIFICATION

POLAND

The ECCC Foundation was established in 2009 to create a new, highly flexible validation and certification system for computer skills for general and professional IT usages.

The initiative was prompted by the clear perception by a group of academic scientists and practitioners that the rapid diffusion of IT devices and services in Poland at the time was facing a serious digital skills gap, and that the new ECCC system they had designed could contribute to fighting it.

DigComp v.1 was adopted in 2014-15 for the design of ECCC version 2 (called ECCC 2.0), which aimed to broaden the scope of validation and certification of digital competence. ECCC Foundation also translated the first DigComp report into Polish and set up the DigComp National Contact Point in 2016, to disseminate information about the framework.

Almost 200,000 ECCC DigComp certificates had been issued to different segments of the population by the end of 2018, reflecting both specific policy measures and the growing demand for digital competences in the labour market.

The case in brief

Leading organisation	**ECCC Foundation**
Sector	NGO
Start / end date	2016 - ongoing
Geographical scope covered	National, Poland
Target audience	Employed • unemployed • generic population
Professional sectors covered	--
Employee profiles covered	--
Stakeholders involved	Training organisations • Government (national and local) • Labour Offices
Online resources	Syllabi in Polish Syllabi in English Learning outcomes in Polish DigComp 1.0 report in Polish Table of content of the DigComp Handbook, in English DigComp into Action Guide - see C7
Tools	-
Contributors	ECCC Foundation Board - Ryszard Woś, Chairman

LMI skilling functions provided

(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓
Outreach to under/ unemployed	
Careers advice	
Personal development plan	
Design and development of training	✓
Delivery of training	
Workforce development	
Assessment of skills	
Certification of competence	✓
Liaising with employers for job placement / experience	
Job search support	
Client tracking and monitoring	
Employee support	

CONTEXT AND DRIVERS

In the years 2008-2009, when the IT market was growing rapidly in Poland, the perception by industry and scientists that the average digital skill levels of the population were very poor only increased. In order to improve this situation, there was an urgent need for new tools to validate the level and development of digital competence among employees, and citizens in general. At that time, the only IT skills validation systems available in the country were ECDL (European Computer Driving Licence) and MOUS (Microsoft Office User Specialist).

The original initiators of the ECCC concept, Dr Marek Miłosz and Dr Jan Smołka, computer scientists and researchers from Polish universities, felt that a flexible validation system was required that could follow and grow together with the rapid evolution of IT, and that could address the needs of different segments of the population. They therefore created a digital competence framework that would support the new validation system. The Foundation named ECCC (European Computer Competence Certificate) was soon established to continue researching and developing the framework, and to start implementing the new validation system, which included creating syllabi and competence certification standards for both general and more specific IT usage areas.

As part of its continuous research process, in 2013-14 the Foundation's researchers decided to adopt the DigComp framework as the basis for the ECCC 2.0 update, and to promote it on a large scale, along with training and examinations for the ECCC DigComp Digital Competence Certificate. This development benefited from the decision in 2016 by the Ministry of Development to request some DigComp-compliant certification in all EU-funded training projects which addressed digital competence development.

ECCC Foundation and the ECCC certification system

Today, the ECCC Foundation is a small non-governmental organisation, with a three-member management board and a chairman to represent the organisation, less than 10 permanent staff, and volunteer collaborators. The Foundation organisation includes: a research team responsible for research and development, an operational team responsible for information, practical implementation and supervising proper functioning and cooperation with examination centres, an administrative office, and the DigComp National Contact Point responsible for providing information about DigComp (more on this below).

Across the country, there are 81 examination centres with 85 certified examiners, as well as hundreds of trainers and teachers who deliver digital skills courses based on ECCC Foundation syllabi and learning materials and certification exams. These are all independent bodies that operate on a commercial and professional basis, on licence agreements signed with the ECCC Foundation. The Foundation also collaborates with educational organisations, NGOs and volunteers. To be accredited by the ECCC Foundation, examination centres, examiners and teachers must meet the conditions specified in the procedure for accrediting ECCC trainers. Examination centres must have adequate infrastructure and employ at least one examiner who is authorised to conduct ECCC examinations. Examiners and trainers must be college/university graduates or have minimum 3 years of vocational or didactic experience in relevant areas. They must pass an exam, after which they receive the keys to access all the ECCC training and information materials available on the ECCC training and validation platform. People with an academic degree (PhD), academic teachers with experience, or who have scientific achievements, or other certificates in relevant areas, are exempt from the exam.

The ECCC sets competence standards for IT users in general and professional IT usage areas (see **T.16**) on four levels: A (Basic), B (Medium), C (Advanced), and D (Expert). The list of professional areas is updated on an ongoing basis. The range of competences on particular levels and in particular area modules are defined precisely in syllabi and are published on the ECCC Polish website and, in part, on its English version.

The definition of certification levels in ECCC is as follows:

A. Level ECCC Foundation sets minimal requirements for ICT users within a particular module. The holder of this level of certificate knows basic theoretical concepts within a particular module (e.g. document processing), and can use general tools on the basic functional level. On this level, approximately 15% of technological possibilities in a given area are tested.

B. Level ECCC Intermediate verifies competencies defined for the ECCC Basic level, together with more extended use of tools and ICT within a particular module. On this level, approximately 30% of technological possibilities in a given area are tested.

C. Level ECCC Advanced proves one's intermediate competencies with fluent use of advanced ICT tools

T.16 ECCC STANDARD MODULES IN DIFFERENT IT USAGE AREAS (IN BOLD)

Information Technology • Computer Hardware and Software • Document Processing • Spreadsheet Calculations • Data Bases • Multimedia • Information-Communication Technology • Mobile Technology • Business Graphics **Digital competences (DigComp)** • Information • Communication • Content creation • Safety • Problem solving	**Professional Informatics** • e-Learning • Healthcare • Tourism • Multimedia in Education • Computer in Primary Education • e-Office • e-Marketing • Interactive Technologies • Graphics for Photographers • Robots • Workflow Management • Information Security • Green Office • Project Planning and Tracking
Computer Science • Programming • Computer Graphics • Web Application Development • Robot programming	**Applied Informatics** • CAD 2D • CAD 3D

within a particular, tested area. On this level, approximately 60% of technological possibilities in a given area are tested.

D. Level ECCC Highly Specialized proves proficiency, significant knowledge and practical skills in the tested area. Approximately 90% of knowledge within the tested area is verified during the examination.

The ECCC examination, which has a fixed fee, verifies the candidate´s skill level in a particular area. The duration (from 30 min to 90 min) and content of examinations vary depending on the candidate's level and the area. An ECCC certificate is granted to a beneficiary after passing an examination. The grade on the certificate is expressed in percentage terms; in other words, the validation system provides on the certificate his/her real competence level at the time of the examination, even if it is very low. This approach is seen to motivate people to increase their competence, if they find it too poor for their own expectations and ambitions or for those of their employers. There are no entrance requirements to take ECCC examinations, and people wishing to be examined independently and voluntarily can freely choose their level and area of examination. The ECCC Foundation, however, recommends that the design of one's learning path is accompanied by a certified vocational counsellor, trainer or ECCC examiner.

In order to support this process, the Foundation designed the Matrix of ECCC Competences, which provides the suggested modules and level to be taken of the eight Information Technology modules for 40 occupations, job roles and other positions (e.g. "Senior citizens, disabled and others at risk of digital exclusion", students at different school levels etc.). The Matrix also suggests the recommended total teaching hours for each category of learner/occupation to training organisations, based on the most common times needed by people taking ECCC-based computer competence courses, which are:

- Level A: Foundation 10-15 hours per module;
- Level B: Intermediate 15–20 hours per module;
- Level C: Advanced 20–30 hours per module;
- Level D: Highly Specialized 30–40 hours per module.

IMPLEMENTATION OF DIGCOMP

Adopting, translating and promoting DigComp

One of the goals of the ECCC Foundation was to align its framework and certification system with the evolving landscape of digital skills in Europe. During the work carried out in 2013-2014 to update the ECCC system to Version 2.0, the Foundation's researchers studied the DigComp report (v.1) in depth and found it very innovative, with great potential for practical implementation, and aligned to the ideas and aims of the Foundation. They therefore started modifying the ECCC system to incorporate DigComp in 2014-2015. In parallel, the ECCC Foundation translated DigComp into Polish, and organised an initial workshop and an open consultation on its use. Following these activities, a larger effort was organised to disseminate the DigComp framework more widely.

The dissemination process involved organising many workshops and conferences targeting end users, training organisations, employers and employment services and other entities. It also involved establishing (as decided in February 2016 by the Foundation board) the Polish DigComp National Contact Point (NCP), run by the ECCC Foundation. The NCP was conceived as a promotional tool and a source of information and counselling for any actor who might be interested in it, including policymakers. ECCC built the digcomp.pl website, which published the Polish version of DigComp 1.0 and established a phone line as part of their activities as NCP. As reported in the DigComp into Action Guide (p. 90), about a dozen people per day contact the NCP from universities, ICT training companies, public administration officials in charge of education and/or EU projects, individual teachers and trainers and citizens.

The ECCC DigComp certificate

In parallel to the above activities, the ECCC Foundation used DigComp as the theoretical framework for the evolution of its ECCC validation system. With the creation of ECCC 2.0, the intention was to achieve a validation system that gives reliable, valuable information on someone's digital literacy level, based on particular competences needed in common work and education practices or in social life. DigComp perfectly suited these aims, and helped the Foun-dation structure such a validation system, which includes five modules, one for each DigComp area, at three proficiency levels, in accordance with DigComp v.1.

As with the overall ECCC system, the method of validating DigComp competences in the online validation platform depends on the participant's level. At the A and B levels, the final grade is derived from a knowledge test. At level C, participants demonstrate their practical skills by performing tasks in real-world conditions. The final grade is the average (in percentage terms) of the component grades (knowledge test, practical tasks).

Since ECCC DigComp became available in late 2016, the demand for these examinations has been growing rapidly, from 38,000 examinations in the year 2017 to above 150,000 examinations in the year 2018.

The composition of ECCC DigComp certificates issued in 2018 by area and level is illustrated in **T.17**. This confirms that the first three modules are more popular, but also that many people take the test for all five areas. The vast majority of tests are taken for the basic level certificate.

T.17 DIGCOMP ECCC CERTIFICATES BY AREA (2018)

MODULES / AREAS	%
DC M1 – Information	22.6
DC M2 – Communication	21.6
DC M3 – Content Creation	21.3
DC M4 – Safety	18.3
DC M5 – Problem Solving	16.2
LEVEL	**%**
A Foundation	83.8
B Intermediate	15.6
C Advanced	0.7

The analysis performed on a sample of over 60,000 ECCC DigComp examination participants in late 2018 showed that 70% had upper secondary education, and most of the remaining had primary (20%) or lower secondary education (5%), 70% were women, 38% were 50-65 years old and 27% were 35-49 years old, 60% were professionally inactive (where only 8% were officially unemployed), and 32% were employed people.

Support for DigComp training

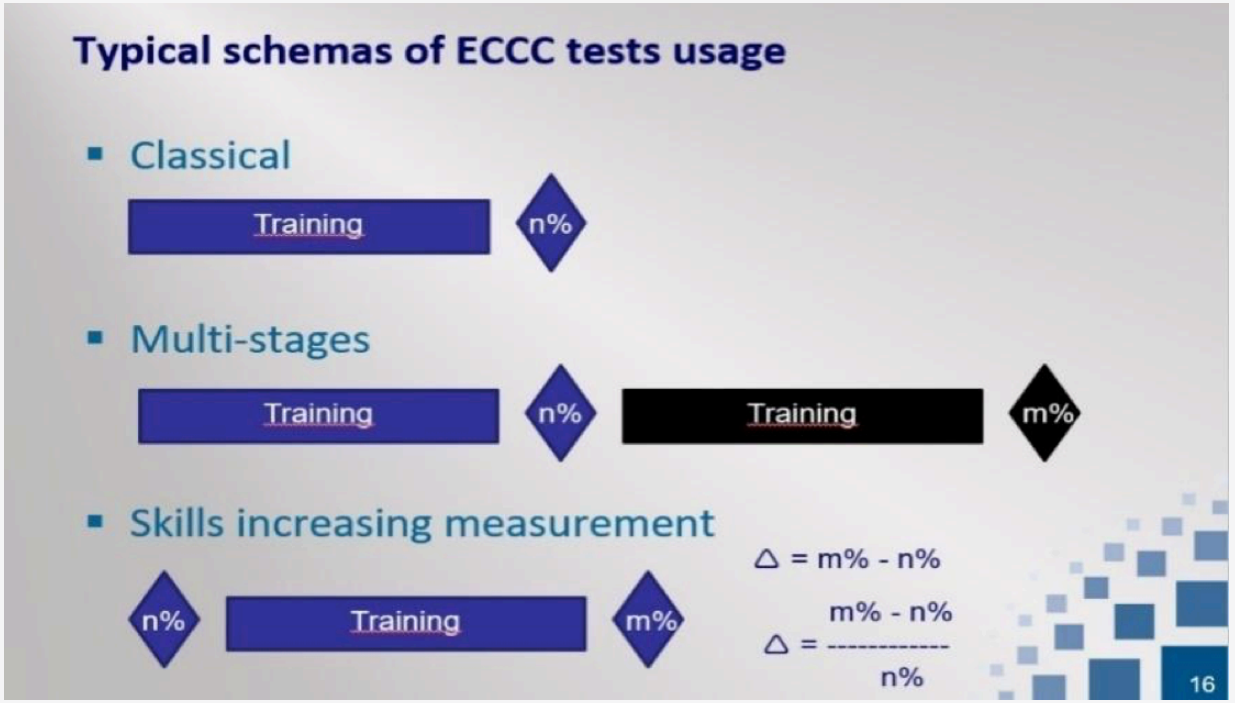
The ECCC Foundation, as explained before, does not deliver training directly training to end users, but rather prepares guidance for training, trains the trainers (at the ECCC Central Education Centre), and also produces learning materials for end users.

Along with the development of the new ECCC DigComp digital competence validation system, the Foundation has produced a set of methodological documentation and training guides based on DigComp, especially for educators:

- Syllabi for all areas and proficiency levels
- Learning outcomes for all DigComp areas and three DigComp proficiency levels
- Polish version of the DigComp report (also available on the NCP platform)
- Leaflet: Understanding Digital Competence in Europe
- The Guide for ECCC DigComp exam's participant

Given the demand for both full (five areas) and par-Given the demand for both full (five-area) and partial (three- and two-area) DigComp courses, the ECCC Foundation also published the DigComp handbook for trainers and trainees, which is available in two versions: Volume 1 with three DigComp areas, Volume 2 with two areas, and one book with all 5 areas.

The ECCC Foundation suggests that training, including on DigComp competence, should be adapted to the needs and characteristics of participants. For example, the average duration of the DigComp course is around 24 hours per area, but it may be longer for older people who need more time to understand the subject, or for people with disabilities, who may need more time to



F.16 EXAMPLES OF ECCC TESTS USAGE

perform operations on a computer.

Training guidance on DigComp competence is provided for the five areas separately, as trainers and trainees may go through one area after the other, from 1 to 5, or may choose only one of them. In practice, as mentioned already, DigComp courses usually cover the first three modules/areas and last about 70 hours or, when they are within EU-funded projects, cover all five areas and last about 120 hours.

DigComp training courses are usually provided in a traditional way, with theoretical sessions and explanation followed by practical activities on computers. Innovative pedagogical approaches might be adopted, but it depends entirely on the trainer's skills and the learning expectations and capabilities of the trainees.

The ECCC Foundation is currently considering making its training and validation platform available to schools based on an open access agreement, and is investing the IPR implications of this.

Towards DigComp 2.1 implementation

The ECCC Foundation took part in the consultations for the preparation DigComp 2.1. The Foundation is now preparing the Polish translation of DigComp 2.1, to be published in 2019 under the patronage of the Ministry of Digital Affairs. In parallel, it has been working on revising the whole ECCC system, including the training and validation platform and materials, to adapt it to the changes brought in by DigComp 2.1.

The Foundation is also improving its evaluation methods, because eight (rather than four) proficiency levels require more precise validation. Also, a new option to validate the relevant level of assessment in real-time during the examination will be made available. Until now, the participant has declared which test level they wanted to take and then the corresponding examination has been used to validate their competence at the selected level. Instead, the new system will validate the participant's level directly, which requires more sophisticated tools. This approach will be especially useful during training, when (as illustrated in **F.16**) a test will be performed before the training starts and then again after the training is delivered, with the certificate showing the trainee's progress precisely.

The release of the new ECCC platform is planned for 2019, but the changes will be im-plemented gradually on the market, to avoid creating difficulties for partners and educators who are currently using DigComp 1.0. A promotional and information campaign is being prepared for it, and the DigComp National Contact Point is expected to play an important role in this process.

The examination platform is available in Polish with restricted access, but some elements have already been prepared in English and Ukrainian, and other language implementations are possible depending on need.

ONLINE RESOURCES

Almost all materials published by the ECCC Foundation are publicly available, and can be shared freely without any conditions. The exceptions are books which are on sale (distributed directly by ECCC Foundation to buyers and bookshops), and materials for accredited teachers and examiners which are available exclusively to them on the training and validation platform, or are distributed by the ECCC Central Education Centre.

The following resources are available online for DigComp (and all ECCC areas and proficiency levels):

- Syllabi in Polish
- Syllabi in English
- Learning outcomes in Polish
- DigComp 1.0 report in Polish
- Table of content of the DigComp Handbook in English
- DigComp into Action Guide - see C7

CONTACTS

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COMPASS

FRANCE • IRELAND • ITALY • ROMANIA

Europe faces a significant skills mismatch, with about 80 million workers either over- (44 million) or under-qualified (36 million). Skills gaps are particularly significant with digital competence, as it is estimated that 90% of jobs require today a minimum level of digital skills, and about 40% of European workers have no or low digital skills.

To address this challenge, the Compass project developed an upskilling online training course for young unemployed people. Using the OECD Skills for Jobs database (S4J) to identify jobs in high demand and the O*NET taxonomy for the requirements for nine DigComp competences in those jobs, Compass selected 8 jobs in four occupation areas: teaching, business and administration, legal, social and cultural professions, general and keyboard clerks. They also developed an online platform offering a self-assessment tool and eight career/learning paths addressing the 9 DigComp competences, available in English, French, Italian and Romanian.

The case in brief

Leading organisation	**Expertise France**
Sector	Government
Start / end date	2016 - 2018
Geographical scope covered	European
Target audience	Employed • Unemployed • Generic population
Professional sectors covered	-
Employee profiles covered	Teaching professionals • Business and administration professionals • General and keyboard clerks • Legal, social and cultural professionals (see **T.19**)
Stakeholders involved	Young unemployed • NEETs
Online resources	Compass self-assessment test Compass training course DigComp into Action Guide - see C10
Tools	-
Contributors	Expertise France - Muriel Santoro, Project Manager, Education, Training and Labour Insertion Unit, and Compass co-project leader Lai-momo - Filippo Mantione, Communication Manager

LMI skilling functions provided

(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓
Outreach to under/ unemployed	✓
Careers advice	✓
Personal development plan	✓
Design and development of training	✓
Delivery of training	✓
Workforce development	
Assessment of skills	✓
Certification of competence	✓
Liaising with employers for job placement / experience	
Job search support	
Client tracking and monitoring	
Employee support	

CONTEXT AND DRIVERS

It is estimated that 90% of jobs today require a minimum level of digital skills, and about 40% of European workers have no or low digital skills. Despite the high level of youth unemployment, there are two million job vacancies in Europe, many in new digital fields or in jobs that require digital skills.

In order to address the above challenges, the Compass project's aim was to develop and pilot a digital upskilling platform that could help bridge the growing gap between the digital skills required for the jobs of the present and the future on the one hand, and the digital skills of three types of young people on the other: secondary-school leavers, young unemployed people with some kind of secondary education, and university students finishing college and looking for a job.

Activities of the project

Compass was co-funded by the European Commission. The Consortium is made up of Expertise France, the French public agency for international technical assistance, SIVECO, the leading software company in Romania, with strong experience in e-learning solutions, Dara Creative*, a brand and marketing consultancy company from Ireland, and Lai-momo, a social cooperative based in Italy working on communication and social inclusion.

The Compass pilot project, with a budget of almost €2m for two years (70% co-financed by the EC, 30% co-financed by the Compass consortium), started in December 2016 and ended in November 2018. It included six work packages: WP1 Needs Analysis & Roadmap, WP2 Educational Approach, WP3 Developing the e-learning platform, WP4 Promoting the platform, WP5 Support and moderation of users in the four pilot countries, WP6 Results and Improvements.

T.18 DIGCOMP AREAS AND COMPETENCES IN COMPASS

AREA	COMPETENCE	
Information and data literacy	1.1	Browsing, searching and filtering data, information and digital content
Communication and collaboration	2.1	Interacting through digital technologies
	2.2	Sharing through digital technologies
	2.4	Collaborating through digital technologies
Digital content creation	3.1	Developing digital content
	3.4	Programming
Safety	4.1	Protecting devices
	4.2	Protecting personal data and privacy
Problem solving	5.3	Creatively using technology

The Compass platform resulting from the project is now available to use online for free, and allows users to choose a professional profile and build a learning path for digital skills relevant to that profile. The development and content of the platform are based on the DigComp framework, focusing on the following nine specific digital competences across all 5 DigComp areas, which were selected for the pilot project, listed in **T.18**.

After the user registers, the platform prompts the user to take a self-assessment test to verify their level of digital competence, to gain awareness of their initial skills and the areas that require further study. The test can only be taken prior to training.

After the first test (or without it), the user can select a profession (career path) within their desired field of work. Initially, four occupational areas with two professions each are available, making eight professions in total. A general description of the profession is presented to the user, together with the set of digital skills and other transversal competences most suited to that profession.

The platform then presents the Compass lessons to develop those skills, which are available at basic and advanced levels. The advanced lessons can only be started after the basic ones have been completed. The platform offers nine basic-level lessons and nine advanced-level lessons for each of the above nine DigComp competences. Each lesson is made up of three informative interactive modules, plus one final assessment. The lesson's content type is the same across career paths, except for the projects to be done in the advanced-level lessons, which are related to the job selected in the career path. When a participant successfully completes lessons, certificates and digital badges are issued. Proof of digital competence is also provided by the "projects" (results of assignments) which are saved in the participant's personal ePortfolio on the platform.

The partners agreed to run Compass beyond the financing period until the end of 2019 and find new partners with the aim of fully developing the platform into an EU-wide digital upskilling platform for young unemployed Europeans. Their future plans for this include adding new career choices, job titles, competences and lessons, always based on DigComp, developing training programmes for vulnerable groups, especially for people with disabilities, young unemployed women and migrants, translating the platform into more languages and launching it in more countries, possibly also in developing countries, and integration with the future Europass CV.

IMPLEMENTATION OF DIGCOMP

DigComp has been the reference framework both for a) specifying the Compass project's concept by identifying the key digital competences to be offered to young unemployed people, and b) designing the structure and content of the training offer, the self-assessment tool and the competence certification using badges.

Using DigComp to map digital competences with career paths

The first stage of Compass was dedicated to identifying, with reference to the labour market characteristics of the partner countries, a) the employment areas and occupations which the training of unemployed young people should be directed towards, and b) the digital skills most in demand in these jobs.

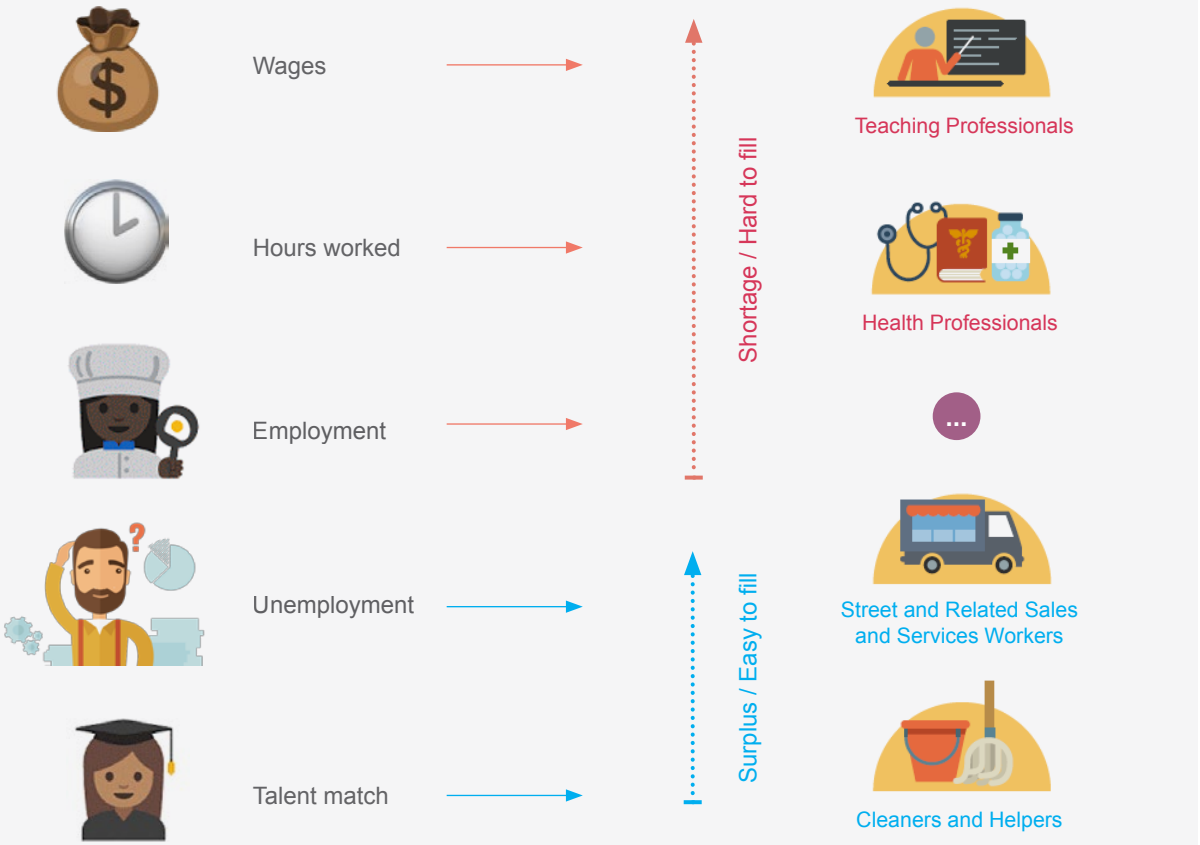
In order to achieve this objective, a User Needs Analysis was carried out in each country. A total of about 360 stakeholders (educational organisations, employers and other labour market actors) and 480 potential end users (young people from 15 to 30 years old) were reached for this task through focus groups, direct interviews and online surveys. The analysis explored four main areas:

1. end users' awareness of, and interest in, digital competences to enhance their employability;
2. the existing online training offer for digital upskilling and any mismatch with respect to employers' skills demands. This allowed an initial list of digital competences to be identified for Compass training, based on employers' expectations;
3. the online training content and educational tools potentially most interesting for addressing end users' needs and employers' requirements. Employers' priorities became clearer at this stage;
4. stakeholders' potential involvement in the future Compass platform and their contribution to the project's sustainability. Ultimately, this line of research aimed to make sure that Compass' training offer and accreditation system would meet employers' expectations, and thus ensure that using Compass would really improve end users' employability.

The research highlighted the lack of understanding of digital competence and how it might contribute to employability among end users, and a similar lack of understanding of what digital competence means (with a partial exception in educational institutions), and difficulty in expressing work-related requirements among stakeholders, including employers.

When the DigComp areas and competences were used to ask both groups which digital competences were most important to them, answers became more structured and focused. Stakeholders identified the DigComp competences that they considered most important for the employability of young people.

End users were also provided with a preliminary list of potential careers and were asked to select (or add) their preferred choice. The most popular careers across all four countries were: Teacher/ Educator; Secretary/



F.17 OECD SKILLS FOR JOBS FRAMEWORK

Administrative staff; Project manager; Marketing & Advertising; Science; Medicine/ Pharmacy; Computer Programming; and, Writer.

In the meantime, Compass partners established a collaboration with the OECD (Employment, Labour and Social Affairs Directorate, Skills and Employability Division) to use the Skills for Jobs database (S4J) to more accurately identify the areas of employment and specific jobs, and the digital skills required in those jobs using the O*NET taxonomy.

The OECD S4J database provides a range of labour market indicators (illustrated in **F.17**)) that can help in understanding which occupations are in shortage (high and unsatisfied demand) and which, instead, are in surplus in the labour market. For instance, if indicators such as wages, number of hours worked, and employment are growing faster than the average in a specific occupation (red arrow) this means that the occupation is in high demand, that it is in shortage or "hard-to-fill" and that employers are looking for people in these occupations. On the contrary, if wages, hours worked or other indicators are pointing down (blue arrow) this means that workers in those occupations are facing more difficulties in finding stable, good quality employment. The demand in the labour market for these occupations is low compared to supply.

The OECD therefore analysed market indicators for the four Compass partner countries, and combined it with other considerations relating to the target group such as the (limited) qualifications required by occupations, and feasible and desired career choices. The aim was also to have an appropriate spread of occupations across different sectors of the economy. Compass partners wanted to highlight the importance of transversal

T.19 OCCUPATIONS AND PROFESSIONS (O*NET CODES) SELECTED FOR COMPASS TRAINING

OCCUPATION AREAS (2-DIGIT)		PROFESSIONS (3-DIGIT)	
23	Teaching professionals	232	Vocational education teachers
		234	Primary school and early childhood teachers
24	Business and administration professionals	241	Finance professionals
		243	Sales, marketing and public relations professionals
41	General and keyboard clerks	411	General office clerks
		412	Secretaries (general)
26	Legal, social and cultural professionals	264	Authors, journalists and linguists
		265	Creative and performing artists

e-skills for employment opportunities in all sectors beyond IT, where there is an unmet job demand. Moreover, since Compass training offer had to be the same in the four countries, and the labour market was similar, but not the same in the four partner countries, a "reasonable average" had to be found in the choice of occupations. The result of these evaluations, combined with the results of the User Needs Analysis, provided the professional fields and professions illustrated in **T.19**.

With the relevant occupations identified, the analysis continued with the assessment of the DigComp competences required in the chosen jobs. The S4J database uses the O*NET work classification system, and provides a profile of the (digital and other) skills for each three-digit job, and their importance to that job on a scale of 1 to 5, and, for each skill, the level of proficiency required on a scale of 1 to 7.

In order to verify which of the 9 DigComp competences previously identified are needed for the eight jobs selected, and at what proficiency level, the OECD created a table of correspondence between the 21 DigComp competences and the digital competences present within O*NET's knowledge, abilities, skills, work context and work activities sections (**T.20** is an excerpt from such table). Since the description of e-skills in O*NET is less detailed and takes a different approach to DigComp, the mapping exercise was not obvious. The text in red indicated where correspondence was found between the two approaches.

Using the correspondence table, the OECD provided a form with the "equivalent" O*NET competence descriptors for each of the eight selected professions, along with the degree of importance and the level of proficiency required in that profession. In cases where a DigComp competence was matched with more than one O*NET competence, an average of the associated values of importance and proficiency had to be made. On the contrary, for DigComp competences were there was no correspondence in O*NET (2.4 Collaboration) a different approach was needed. In other specific cases, adjustments were manually made to correct anomalous results. As a result, it was possible to establish the intensity with which each occupation uses different digital skills, and to define the level of proficiency which the user needed to acquire.

DigComp in the design of Compass training

The results of the previous activity were used to design the Compass training offering for the nine digital skills. Based on the importance and proficiency levels obtained for each competence, a scale and thresholds were built to a) exclude certain competences from a profession, when their importance was below the minimum threshold level, b) decide for the remaining competences whether these should be developed at the basic or advanced level.

Again, as with the choice of occupations, the application of the thresholds criterion was complemented by considerations related to the project objectives. Compass wanted to develop a diversified training offer which would be attractive and meaningful for young unemployed people. Thus, for example, it was decided that the training would cover a certain minimum number of skills, and that the same skill should not be acquired at the same proficiency level in all jobs. The result of

T.20 EXAMPLE OF DIGCOMP - O*NET CORRESPONDENCE
(The text in purple indicates where the correspondence was found between the two approaches)

EU DIGCOMP 2.1 (1. INFORMATION AND DATA LITERACY)		O*NET (KNOWLEDGE, ABILITIES, SKILLS, WORK CONTEXT AND ACTIVITIES)
1.1	**Browsing, searching and filtering data, information and digital content** To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies.	**Getting Information** Observing, receiving, and otherwise obtaining information from all relevant sources.
1.2	**Evaluating data, information and digital content** To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret and critically evaluate the data, information and digital content.	**Analyzing Data or Information** Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts. **Processing Information** Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying info or data

this process is the scheme of competence levels for each profession illustrated in **T.21**, which, in turn, were covered by the Compass training offer.

The decision to only develop training for the Foundation and Advanced competence levels was made, as already mentioned, to avoid making the training offer too complex for end users to understand, and to cope with the practical difficulty of managing the eight-level proficiency segmentation of DigComp 2.1.

Each lesson is made up of four modules: three informative interactive learning modules, plus one final assessment module with quizzes (with matching, single choice, drag-and-drop, true/false and ranking exercises). In many Advanced lessons, learners are asked to do some project works/assignments as part of Module 3 or 4, which can be uploaded onto their personal e-portfolio, to document learning achievements.

In preparing the lessons, DigComp 2.1 has been used systematically as follows. For each lesson,

- the title corresponds to the DigComp competence title;
- the general objectives correspond to the DigComp competence descriptor;
- the specific objectives of each of the four modules correspond to some of the bullet points with competence descriptors/learning outcomes of DigComp levels 1-3 for Compass Foundation lessons and DigComp levels 4-7 for Advanced lessons.

The user earns official recognition of taking a lesson if the score obtained for the assessment module is over 75% obtaining certification and a digital badge available for download and/or for sharing.

DigComp and the Compass self-assessment test

After registering on the platform, users are offered the possibility to take a test to verify their level of digital competence, and to become aware of their initial skills and the areas that require further study. The test is structured according to the five DigComp areas, and users can choose to take the test for one or more areas. If the user chooses all five areas, the system presents a sequence of 18 questions to assess the respondent's knowledge of topics relating to the nine DigComp competences managed by Compass. After the user has answered all the questions, the system shows which ones were answered correctly and which incorrectly, and the score achieved for each question. In the final step, these results are summarised in an overall assessment statement for each area (excellent, good etc.). As both test results and lessons are based on the same (DigComp) framework, users can find out which Compass lessons can help them improve the competences in which they obtained weaker results.

T.21 COMPETENCE LEVEL OF COMPASS LESSONS BY CAREER PATH (F=FOUNDATION, A=ADVANCED)

CAREER PATH	DIGCOMP COMPETENCES								
	1.1	2.1	2.2	2.4	3.1	3.4	4.1	4.2	5.3
Vocational education teachers	F	F			A	F	A	A	F
Primary school and early child. teachers	F	F			A	F	A	A	A
Finance professionals	A	F		F	A	A		F	A
Sales, marketing and PR professions	F	A	F	F	A	A			A
General office clerks	A		A	A	F	F	F	F	
Secretaries (general)	A	F		A	F	A	F	F	
Authors, journalists and linguists	A	A	F		A	F	F	F	F
Creative and performing artists	A	A	F	F	A	F			F

ONLINE RESOURCES

- The Compass self-assessment test is available in English, French, Italian and Romanian.
- The Compass training course is available in English, French, Italian and Romanian.
- DigComp into Action Guide - see C10

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C6

MU.SA

BELGIUM • **GREECE** • ITALY • PORTUGAL

The Mu.SA (Museum Sector Alliance) project addresses the digital competence gap created by the disconnection between formal education and training of museum and cultural professionals and the diffusion of new digital opportunities in this area. It defined four new job role profiles - Digital Strategy Manager, Digital Collections Curator, Digital Interactive Experience Developer, Online Community Manager- through the complementary use of DigComp and the e-Competence Framework for IT professionals (e-CF). It then created a modular training path and related tools (including a MOOC) to develop those competences among museum professionals.

Mu.SA shows how DigComp can be used to define new digital job profiles in the museum sector and it illustrates a replicable process (and its complexity) to extend this result to the broader cultural sector.

The case in brief

Leading organisation	**Hellenic Open University (HOU) – DAISSy research group**
Sector	Higher Education Institute
Start / end date	2016 - 2019
Geographical scope covered	European
Target audience	Employed (museum professionals) • unemployed (cultural sector)
Professional sectors covered	Museum professionals • cultural sector professionals
Employee profiles covered	Digital Strategy Manager • Digital Collections Curator • Digital Interactive Experience Developer • Online Community Manager
Stakeholders involved	Museum and cultural sectoral and professional organizations • Regional public administrations • VET providers and certification bodies • cultural NGOs and private companies
Online resources	Mu.SA report: Emerging Job Roles for Museum Professionals Mu.SA report: The Museum of the Future Mu.SA report: Museum Professionals in the Digital Era DigComp into Action Guide - see C06
Tools	5. Linking eCF, EQF and DigComp competences of the 4 new Mu.SA digital profiles 6. Transferable competences of the 4 new Mu.SA digital profiles
Contributors	HOU - Achilles Kameas, Professor at School of Science and Technology and director of DAISSy research group (based on discussions and collaboration with the members of the consortium)

LMI skilling functions provided

(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓
Outreach to under/ unemployed	
Careers advice	
Personal development plan	
Design and development of training	✓
Delivery of training	✓
Workforce development	
Assessment of skills	
Certification of competence	✓
Liaising with employers for job placement / experience	✓
Job search support	
Client tracking and monitoring	
Employee support	

CONTEXT AND DRIVERS

Studies carried out by Mu.SA partners in the previous eCult Skills project (2013-2015) under the Lifelong Learning Program of the European Commission, and later confirmed by the research outcomes of the Mu.SA project itself (see the resources section of the second and third report, the Museum of the Future and Museum Professionals in the Digital Era) have shown that the structure and function of museums and cultural organisations are rapidly changing due to the increased adoption of IT, and that new job roles are emerging that include substantial IT qualification components. However, due to the increasing pace of IT adoption in these sectors, a strong disconnect has also been observed between formal education and training of museum and other cultural professionals on the one hand, and the world of work on the other. This is a new challenge which adds to more structural challenges, which in three Mu.SA partner countries (Greece, Italy and Portugal) are represented by low levels of investment in infrastructure and human resources (which contribute to the limited level of digital competence among current employees) and by a lack of clear vision among managers in the cultural sector and policymakers alike as to the opportunities that digital technologies can bring to help museums thrive in their role.

The Mu.SA project was conceived to contribute to closing the digital competence gap by identifying and defining new European profiles for emerging job roles in museums and by creating and delivering a training program to develop the competence needed for those job roles. By showing the relevance and potential of the new emerging profiles, Mu.SA partners also hope to contribute to the mental shift and cultural change in the planning of and vision for of museum services, so that the digital element becomes an integral part of the approach from the outset.

Aims and development of the Mu.SA project

The Project "Mu.SA: Museum Sector Alliance" is addressed broadly to professionals (employed or unemployed) and students in the cultural and more specifically the museum sector. The aim of the project is to assist the target group in developing the necessary digital and transversal competences that will provide them with better employment and career opportunities in the "museum of the future".

Funded by the European Commission Erasmus and KA2 Sector Skills Alliances framework, with a budget of €1.19m, it was implemented from November 2016 until the end of 2019 in four European countries (Greece, Italy, Portugal and Belgium) by a consortium of 11 partners from the museum and culture sector and the educational/training sector.

Identifying and specifying emerging job roles

The first step of the project was an extensive needs analysis, through a consultation with experts and practitioners from museums, higher education and VET providers, museums and museum networks (e.g. NEMO, CAE), cultural authorities (e.g. IBACN in Italy) and professional associations (e.g. ICOM), many of them members of the project consortium. The aim of this process was to better define the emerging job roles and the digital competences needed for them.

The eCult Skills project had previously identified five job role profiles to support museums in their digital journey: Cultural ICT consultant, Cultural ICT Guide, Digital Cultural Assets Manager, Interactive Cultural Experience Developer, and Online Cultural Community Manager. The new Mu.SA research aimed on the one hand to understand whether these profiles were still relevant to museums in the three countries and to update them accordingly, and on the other hand to identify which other digital competences most required development in that context.

Mu.SA partners carried out some preliminary interviews with experts, which immediately highlighted two things. Firstly, the five profiles as they had previously been defined, exclusively based on the e-CF framework (which is the standard for IT professionals), were too advanced in terms of skills requirements for the local context, and a wider range of digital and 21st century skills should be taken into account. Secondly, digital competence development needs should be considered across the whole spectrum of museum professionals. The consultation on digital competence needs involved 81 people in direct interviews and focus groups, and 275 respondents to an online survey. Reflecting the above initial feedback, Mu.SA partners asked participants to consider the five eCult Skills job role profiles, and to rate the importance for each of them (on a 1 to 5 scale) of all the digital competences included in the e-CF and DigComp frameworks, plus a list of transferable digital competences related to 21st century skills. These are defined as those hard and soft skills that relate to many occupations, which are used in one job or career and can be used also in another, e.g. creative thinking and communication skills with MS Office Suite applications, or time management using applications

such as MS Outlook. The list of transferable competences was drawn up on the basis of previous European projects such as Arts, ADESTE and CREA.M. The final transferable competences which were ultimately selected are listed in **TOOL 6**.

As a result of this process, a deep revision was made of the previous profiles and 29 digital skills from e-CF, 17 from DigComp and 20 transferable skills were selected as the relevant competences of four new ICT-related job role profiles, briefly described in **T.22**. See the resources section, Emerging Job Roles for Museum Professionals, for a full description.

Significantly, the Mu.SA consultation process confirmed that, beyond the emerging digital job profiles, there was also a strong need to raise museum professionals' digital cultural awareness and confidence. This meant developing the digital skills of all staff at a museum, regardless of their role, from the lower to the upper levels of the organisation, according to their specific functions and tasks.

In the second project phase, Mu.SA partners designed the learning outcomes associated with the key digital and transversal competences, both of the emerging digital job profiles and those needed to build digital confidence on a wider scale. Then a professional development pathway was designed and implemented in three stages and with a combination of different learning modes.

1. The first step was the **MOOC** "Essential digital and transversal competences for museum professionals". It is a first training stage common to all profiles, and open to all museum professionals. It was designed to support them in improving their digital

T.22 EMERGING MUSEUM JOB ROLE PROFILES AND DESCRIPTIONS

Digital Strategy Manager (also known as) Cultural ICT Consultant Digital Cultural Manager Cultural Digital Strategy Manager Cultural ICT Ambassador Digital cultural mediator Cultural ICT Advisor Cultural ICT specialist	Supports a museum's technological and digital innovation and helps museums to thrive in a digital environment, has a good knowledge of how a museum works and provides them with updated information about digital products, and plays a mediating role between the internal museum departments and external stakeholders. It is a strategic role for all the museums that aim at thriving in a digital environment in line with the overall museum strategy.
Digital Collections Curator (also known as) Digital Cultural Asset Manager Digital Asset manager Born-Digital Material Curator Digital Curator	Improves the museum's digital preservation, management and exploitation plan for all digital or digitized cultural contents, develops online and offline exhibitions and content for other departments, produces metadata according to recognised international standards, and provides information on copyright and protection of digital cultural property according to international standards. This role is specialised in preserving and managing digital materials.
Digital Interactive Experience Developer (also known as) Interactive Experience Developer Digital Interactive Experience Designer Exhibition Interactive Designer	Carries out audience research and observation analysis, designs and develops interactive and innovative installations providing meaningful experiences for all types of audiences, develops accessibility tools for all types of visitors, and facilitates communication flow between museum teams and external high-tech companies. This role is specialised in designing, developing and implementing innovative and interactive experiences for all types of visitors.
Online Community Manager (also known as) Online Cultural Community Manager Online Community Developer Online Community Specialist Social Media Specialist Digital Media Curator Visual Media Curator New Media Manager Digital Communication Manager Social Media Manager	Designs and implements an online audience development plan in line with the museum's overall strategic communication plan, liaises effectively with the other departments within the organisation in order to produce both content and meaningful online experiences, engages with, monitors and manages online audiences, and assesses and evaluates the effectiveness and efficiency of online activities. This role profile is vital for all museums aiming to invest in developing and engaging diverse audiences online and should be fully integrated into the institutional structures

competences in order to become more productive in the new digital era, efficient in collaborating with other professionals and organisations inside and outside of their sector, and successful in managing emerging challenges. The MOOC has a total duration of eight weeks and a required study effort of 80 hours. The course is free and open to all. The main language of training is English, but by the end of the project all content will be provided in Greek, Italian and Portuguese (currently, only videos and presentations are subtitled). The MOOC went live in January 2019.

2. Learners that complete the MOOC and succeed in at least 80% of graded activities are eligible to continue their learning by applying for an advanced, six-month **specialization training course**, in one of the emerging job profiles. This course is implemented as a combination of elearning and face-to-face training.
3. A selected group of learners who successfully finished both the MOOC and the specialization training would access a **work-based learning** experience in one of the European museums for a total of 2 months.

Thanks to the numerous events organized by the project partners, 5.200 people registered in the MOOC from all over the world as soon as it was launched!

IMPLEMENTATION OF DIGCOMP

The previous e-Cult project had taken into consideration exclusively digital skills from the e-CF, which experts consulted by Mu.SA found was too "advanced" for the context. In the new Mu.SA project, partners therefore decided to take a broader view of digital competence, in order to cater for the needs of museum professionals, as they wanted to design job profiles that would be well-founded and well-structured. DigComp provided a complete, structured and modular framework for digital competence, which could be easily combined with e-CF and with transversal competences, and adapted to the domain of application. Moreover, with DigComp being a validated framework at European level, partners expected that it would facilitate the certification of job roles and recognition of the qualifications acquired via the Mu.SA training courses. For these reasons, all DigComp 2.1 competences were used to complement the competences of e-CF 3.0, and were included in the checklists used for the job profile design and evaluation stage. The learning outcomes were based on the general competence descriptors, and the example learning outcomes provided in the frameworks. Where necessary, both descriptors and outcomes were adapted to the specific domain of application, so that the resulting learning outcomes were as domain-specific as possible. This is also reflected in the training material developed later.

While the DigComp framework was well known to researchers on the Mu.SA project who coordinated organisation, participants in the Mu.SA consultation and profile design process, including partners, were initially unaware of DigComp. For this reason, all partners had to get acquainted with the DigComp specification and selected literature, and to be trained and supported through online answers to their questions from the coordinator during the need analysis phase. In addition, before each consultation/interview, partners had to present e-CF and DigComp frameworks to the interlocutors. Through these activities, a side effect of the project was to raise awareness of these frameworks in the museum sector, and among all those involved in evaluating and improving the profiles.

The result of the competence needs analysis is illustrated in **TOOL 5** and **TOOL 6**, which show the e-CF and complementary DigComp competences required and proficiency level, their importance and whether they are mandatory or optional for each of the four new job role profiles.

The next step was to organise a workshop with the participating partners' representatives to define the course outlines and design the learning outcomes. To do that, first they went through all profiles and competences that resulted from the expert consultation, then they analysed the profiles using the competences and the associated levels, producing descriptions and sample learning outcomes. Finally, the common and most important competences were selected to be included in the MOOC, while the rest were left for the specialisation courses.

In the final step, a multi-disciplinary team of training content developers was assembled in each country, consisting of subject experts, instructional experts, reviewers, technicians, media specialists, etc. As most of them had limited knowledge of DigComp, in order to design and produce high-quality content for the courses they also had to become familiar with it, and with the proposed learning outcomes.

The "Essential digital skills for museum professionals" MOOC course which eventually resulted from this activity, states that once they have completed it, learners

will be able to:

a. Develop and use the necessary digital and transferable competences, to act as knowledgeable professionals in the museum sector;
b. Manage data, information and digital content;
c. Collaborate using digital technologies;
d. Develop a digital strategy and management plan for a museum;
e. Be competent in ICT tools and means for applying them to museum objects;
f. Upskill the ICT background required for the sector;
g. Use web 2.0 tools in the museum;
h. Be efficient in time management, communication, team working, leadership and creative thinking;
i. Identify needs and technological responses;
j. Develop digital content;
k. Be aware of emerging job role profile descriptions;
l. Empower the development of 21st century skills;
m. Actively participate in an online learning community;
n. Be competent as a museum professional with strong ICT skills at European level.

These achievements (learning outcomes) are related to a combination of e-CF and DigComp competences, as summarised in **T.23**.

The MOOC is open to a wide audience, and the targeted proficiency levels at this stage are lower.

The MOOC courses are modular, and last for eight weeks. Each week, the course lasts ten hours and addresses two to three modules. Each module corresponds to one competence, and consists of several units. Each unit

T.23 LIST OF E-CF AND DIGCOMP COMPETENCES ADDRESSED BY THE MU.SA TRAINING

E-CF COMPETENCES	DIGCOMP 2.1 COMPETENCES
A.1 – IS and Business Strategy Alignment A.2 – Service Level Management A.3 – Business Plan Development A.4 – Product / Service Planning A.6 – Application Design A.7 – Technology Trend Monitoring A.8 – Sustainable Development A.9 – Innovating B.1 – Application Development B.3 – Testing B.4 – Solution Deployment B.5 – Documentation Production C.1 – User Support C.2 – Change Support C.3 – Service Delivery C.4 – Problem Management D.1 – Info. Security Strategy Development D.2 – ICT Quality Strategy Development D.3 – Education and Training Provision D.4 – Purchasing D.10 – Information and Knowledge Mgmt. D.11 – Needs Identification D.12 – Digital Marketing E.1 – Forecast Development E.3 – Risk Management E.4 – Relationship Management E.5 – Process Improvement E.6 – ICT Quality Management E.7 – Business Change Management	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, info. and digital content 1.3 Managing data, info. and digital content 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity 3.1 Developing digital content 3.3 Copyright and licenses 3.4 Programming 4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment 5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competences gap

corresponds to one learning objective that has been explicitly developed for it. Therefore, specific modules have been allocated to each DigComp competence, and various units have been included in each module. Moreover, each unit includes a quiz, which tests the learning outcomes for the unit.

The higher target proficiency levels of e-CF (3,4,5) and DigComp (6,7,8) competences illustrated in **TOOL 5**, relate to the new job role profiles, and are planned to be acquired through additional specialised trainings described above in step 2, and indicated in **TOOL 5** and **6** as "Training delivered through eLearning". A similar logic as for the MOOC course was applied for the organisation and content design of the specialisation courses, which were more focused on the four emerging job profiles.

Given this approach, the modules´ organisation, the training materials and the assessment tests systematically reflect the DigComp and e-CF competence frameworks in all training pathways.

Since the end of the project, the final version of the MOOC has been made available to interested students once or twice per year. Mu.SA partners are free to use the MOOC or its contents in any training course they develop.

ONLINE RESOURCES

- The Mu.SA project report Emerging Job Roles for Museum Professionals presents the research process, the four new job roles and the digital and transversal competences that characterize each role:
- The Mu.SA project report The Museum of the Future: insights and reflections from 10 international museums collects the visions of the next generation of museums by 10 international expert museum professionals
- The Mu.SA project report Museum Professionals in the Digital Era: agents of change and innovation summarizes the training needs of museum professionals and the available training offers, as they were recorded during the research in Greece, Italy and Portugal, identifying gaps in knowledge, skills and competences.
- DigComp into Action Guide - see C06

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TOOL 5. 1/3 - LINKING ECF, EQF AND DIGCOMP COMPETENCES OF THE 4 NEW MU.SA DIGITAL PROFILES

(+ LEVELS TO BE DEVELOPED AND TRAINING DELIVERY MODE)

E-COMPETENCES		NEW DIGITAL MUSEUM PROFILES e-x **: required / e-y *: desired Very important (mandatory) / Important (mandatory) / important (optional) / (optional)				TRAINING DELIVERY Mooc Elearning	LEVELS TO BE DEVELOPED e-3 (e-CF) = Level 6 EQF e-4 (e-CF) = Level 7 EQF e-5 (e-CF) = Level 8 EQF	RELATED WITH DIGCOMP COMPETENCES (AND PROFICIENCY LEVELS)
		DIGITAL STRATEGY MANAGER	DIGITAL COLLECTIONS CURATOR	DIGITAL INTERACTIVE EXPERIENCE DEVELOPER	ONLINE COMMUNITY MANAGER			
A.1	**IS and Business Strategy Alignment**	e-4 **/ e-5 *	e-4 **/ e-5 *	e-4 **/ e-5 *	e-4 **/ e-5 *	M	e-5	1.1 Browsing, searching and filtering data, information and digital content (PL8) 1.3 Managing data, information and digital content (PL8)
A.2	**Service Level Mgmt.**	e-3 **/ e-4 *				E	e-4	3.3 Copyright and licenses (PL7)
A.3	**Business Plan Development**	e-3 ** / e-4 *	e-3 ** / e-4 *	e-3 ** / e-4 *	e-3 ** / e-4 *	M	e-4	1.2 Evaluating data, information and digital content (PL7) 5.2 Identifying needs and technological responses (PL7)
A.4	**Product / Service Planning**	e-3 **	e-3 ** / e-4 *	e-3 ** / e-4 *	e-4 **	E	e-3	5.2 Identifying needs and technological responses (PL6)
A.5	**Architecture Design**							
A.6	**Application Design**			e-3 **		E	e-3	3.4 Programming (PL6) 5.2 Identifying needs and technological responses (PL6)
A.7	**Technology Trend Monitoring**	e-3 **/ e-4*	e-5**	e-5**	e-4 ** / e-5*	M	e-4, e-5	1.2 Evaluating data, information and digital content (PL7) 2.5 Netiquette (PL7)
A.8	**Sustainable Development**	e-3 ** / e-4 *				E	e-4	4.3 Protecting health and well-being (PL7) 4.4 Protecting the environment (PL7)
A.9	**Innovating**	e-4 ** / e-5*	e-5 **	e-4 ** / e-5*	e-4 ** / e-5*	M	e-5	5.3 Innovating and creatively using technology (PL8) 2.4 Collaborating through digital technologies (PL8)
B.1	**Application Development**			e-3 **		E	e-3	3.4 Programming (PL6)
B.2	**Component Integration**							

TOOL 5. 2/3

E-COMPETENCES		NEW DIGITAL MUSEUM PROFILES e-x **: required / e-y *: desired Very important (mandatory) / Important (mandatory) / important (optional) / (optional) DIGITAL STRATEGY MANAGER	DIGITAL COLLECTIONS CURATOR	DIGITAL INTERACTIVE EXPERIENCE DEVELOPER	ONLINE COMMUNITY MANAGER	TRAINING DELIVERY Mooc Elearning	LEVELS TO BE DEVELOPED e-3 (e-CF) = Level 6 EQF e-4 (e-CF) = Level 7 EQF e-5 (e-CF) = Level 8 EQF	RELATED WITH DIGCOMP COMPETENCES (AND PROFICIENCY LEVELS)
B.3	**Testing**			e-3 **		E	e-3	
B.4	**Solution Deployment**			e-3 **		E	e-3	4.1 Protecting devices (PL6) 4.2 Protecting personal data and privacy (PL6)
B.5	**Documentation Production**		e-3 *	e-3 **	e-4**/e-5*	E	e-3, e-4	
B.6	**Systems Engineering**							
C.1	**User Support**			e-3 **	e-3 **	E	e-3	
C.2	**Change Support**			e-3 **		E	e-3	
C.3	**Service Delivery**		e-3 **			E	e-3	
C.4	Problem Management		e-4 **	e-4 **	e-4 **	E	e-4	5.1 Solving technical problems (PL7)
D.1	Information Security Strategy Development	e-3 **/ e-4*				E	e-4	4.1 Protecting devices (PL7)
D.2	ICT Quality Strategy Development				e-5 **	E	e-5	5.3 Creatively using digital technologies (PL8)
D.3	Education and Training Provision	e-3 **				E	e-3	5.4 Identifying digital competences gap (PL6)
D.4	Purchasing	e-3 **/ e-4*	e-3**/e-4*			E	e-4	
D.5	Sales Proposal Development							
D.6	Channel Management							
D.7	Sales Management							

TOOL 5. 3/3

E-COMPETENCES		NEW DIGITAL MUSEUM PROFILES e-x **: required / e-y *: desired Very important (mandatory) / Important (mandatory) / important (optional) / (optional) DIGITAL STRATEGY MANAGER	DIGITAL COLLECTIONS CURATOR	DIGITAL INTERACTIVE EXPERIENCE DEVELOPER	ONLINE COMMUNITY MANAGER	TRAINING DELIVERY Mooc Elearning	LEVELS TO BE DEVELOPED e-3 (e-CF) = Level 6 EQF e-4 (e-CF) = Level 7 EQF e-5 (e-CF) = Level 8 EQF	RELATED WITH DIGCOMP COMPETENCES (AND PROFICIENCY LEVELS)
D.8	Contract Management							
D.9	Personnel Development							
D.10	Information and Knowledge Mgmt.	e-3 ** /e-4*	e-5 **			E	e-4, e-5	1.3 Storing and retrieving information (PL8)
D.11	Needs Identification	e-4** /e-5 *	e-4**/e-5*	e-3 **	e-4**/e-5 *	M	e-3, e-4	3.1 Developing digital content (PL7)
D.12	Digital Marketing				e-4 **	E	e-4	5.3 Creatively using digital technologies (PL7)
E.1	Forecast Development	e-3 **	e-3**/e-4*	e-4 **	e-4 **	M	e-3, e-4	5.2 Identifying needs and technological responses (PL7)
E.2	Project and Portfolio Mgmt.							
E.3	Risk Management	e-3**/ e-4*	e-3**/e-4*	e-3**/e-4*		E	e-4	2.6 Managing digital identity (PL7)
E.4	Relationship Management	e-4 **	e-4 **	e-4 **	e-4 **	M	e-4	4.2 Protecting personal data and privacy (PL7)
E.5	Process Improvement	e-3**/ e-4*				E	e-4	1.2 Evaluating data, information and digital content (PL7)
E.6	ICT Quality Management	e-3**/ e-4*	e-4 **	e-3**/ e-4*	e-4 **	M	e-4	1.3 Managing data, information and digital content (PL7)
E.7	Business Change Mgmt.	e-3**/ e-4*			e-4**/e-5 *	E	e-4	1.2 Evaluating data, information and digital content (PL7)
E.8	Information Security Mgmt.							
E.9	IS Governance							

TOOL 6. TRANSFERABLE COMPETENCES OF THE 4 NEW MU.SA DIGITAL PROFILES (A: VERY IMPORTANT B: IMPORTANT)

TRANSFERABLE COMPETENCIES	DIGITAL STRATEGY MANAGER	DIGITAL COLLECTIONS CURATOR	DIGITAL INTERACTIVE EXPERIENCE DEVELOPER	ONLINE COMMUNITY MANAGER	TRAINING DELIVERY THROUGH
Communications skills	A	A	A	A	MOOC
Mentoring / coaching skills	A	A		B	eLearning
Analyse and synthesize information	A		A	A	eLearning
Negotiation skills	A		A	A	eLearning
Team working	A	A	A	A	MOOC
Networking skills	A	A	B	B	eLearning
Creative thinking skills	A	A	A	A	MOOC
Sense of initiative and entrepreneurship	A	B	A	A	eLearning
Resilience	A		B	A	eLearning
Leadership and change facilitator	A	A	A	A	MOOC
Decision making	A	A	B	A	eLearning
Time management	B	A	A	A	MOOC
Management skills		A		A	eLearning
Interpersonal skills		A	A	A	eLearning
Mediation skills		B	B		eLearning
Influence / persuasion skills		B		B	eLearning
Active listening skills		B	A	A	eLearning
Storytelling			A	A	eLearning
Fast-driven			A		eLearning
Integrity / ethical				A	eLearning

C7 SMARTIVEMAP

ITALY

Large organisations today face a digital transformation, which has been generated by disruptive technology and business innovation in the globalised economy. From the levels of management through to the workforce, large organisations are often lacking the right mind-set, skills, and competences to approach technology, people, and business changes together. This is the real challenge posed by the digital transformation. Smartive, a start-up in Milano, developed SmartiveMap, a self-assessment tool used to start measuring the readiness of individuals and organisations facing this challenge, based on their openness to change, and their digital skills. Assessment questions on digital competence were partly drawn from DigComp, and were also identified by business function experts in the following areas: purchasing, operations, finance and controlling, marketing and sales, human resources, and ICT. Following an initial assessment, Smartive designs and carries out communication, training, and other actions to enable and manage change in the customer organisations. Smartive's experience shows the importance of blending the development of both hard and soft skills, to achieve effective digital transformation.

The case in brief

Leading organisation	**Smartive**
Sector	Commercial
Start / end date	2016 - ongoing
Geographical scope covered	National, Italy
Target audience	Employed
Professional sectors covered	All private sectors and public (EFSA)
Employee profiles covered	-
Stakeholders involved	Enterprises • business consultants
Online resources	Free SmartiveMap self-assessment test Corporate SmartiveMap self-assessment test DigComp into Action Guide – see C18
Tools	-
Contributors	Smartive - Marco Mazzini, Managing partner Smartive - Francesca Montemagno, partner (EFSA project)

LMI skilling functions provided

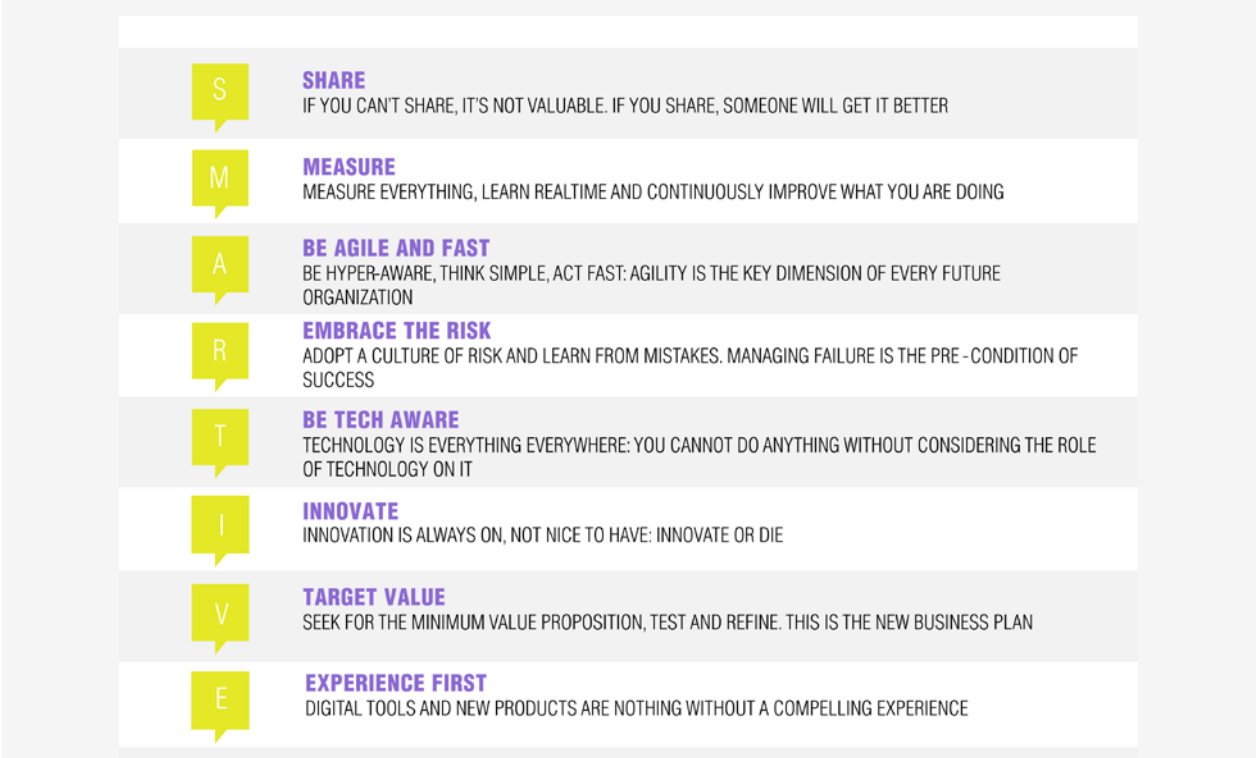
(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓
Outreach to under/ unemployed	
Careers advice	
Personal development plan	
Design and development of training	✓
Delivery of training	✓
Workforce development	✓
Assessment of skills	✓
Certification of competence	
Liaising with employers for job placement / experience	
Job search support	
Client tracking and monitoring	✓
Employee support	✓

CONTEXT AND DRIVERS

The digital transformation generated by disruptive technology and business innovation in the globalised economy is affecting large companies and public organisations, as well as national and local markets, and the public sector. The larger the organisation, the more difficult it is to bring about any substantial amount of change. It is often the case that the right mindset, skills, and competencies to understand and react to this kind of innovation are seldom found throughout the entire chain of command in larger organisations. They also tend not to have an integrated view or a holistic approach to address technology, people, and business transformation together. As this is the real challenge of the digital transformation, the mission of Smartive - a private consultancy company based in Milano - is to support these organisations in designing and managing what Smartive calls their unique "journey" to digital transformation, with a specific focus on increasing the digital competence of all staff.

Human resources (HR) departments are typically the entry point to initiate this process, as they have the responsibility of responding to the changing needs of the organisation with existing staff (with upskilling training, if needed), and with new recruits. Despite this level of responsibility, HR departments seldom have a clear idea of what constitutes digital competence, which type and level of digital competence is needed in the company, and how to develop it. On the other hand, IT departments tend to see and cater for only the technical side of digital competence, providing training and support to guarantee that employees can use the digital tools and procedures required for their work. The top management of the organisation, in turn, can generate ideas about business transformation opportunities, and how new technologies can help, but they may not have an understanding of their employees' readiness to change.



F.18 THE SMARTIVE MANIFESTO ON "OPEN TRANSFORMATION"

Smartive therefore presents to its clients a view of the digital challenge today as not being just about technology, but also about changing the way in which people and companies operate. All business processes and dimensions – from data analytics to channel strategy, from operations to company culture –require the integration of digital tools and procedures as a "transversal" factor. As such, digital competencies must be in place in order for digital transformation to be effective.

This view has been translated into the Smartive Manifesto (**F.18**), which summarises the key words and concepts identified as drivers of "open transforma-

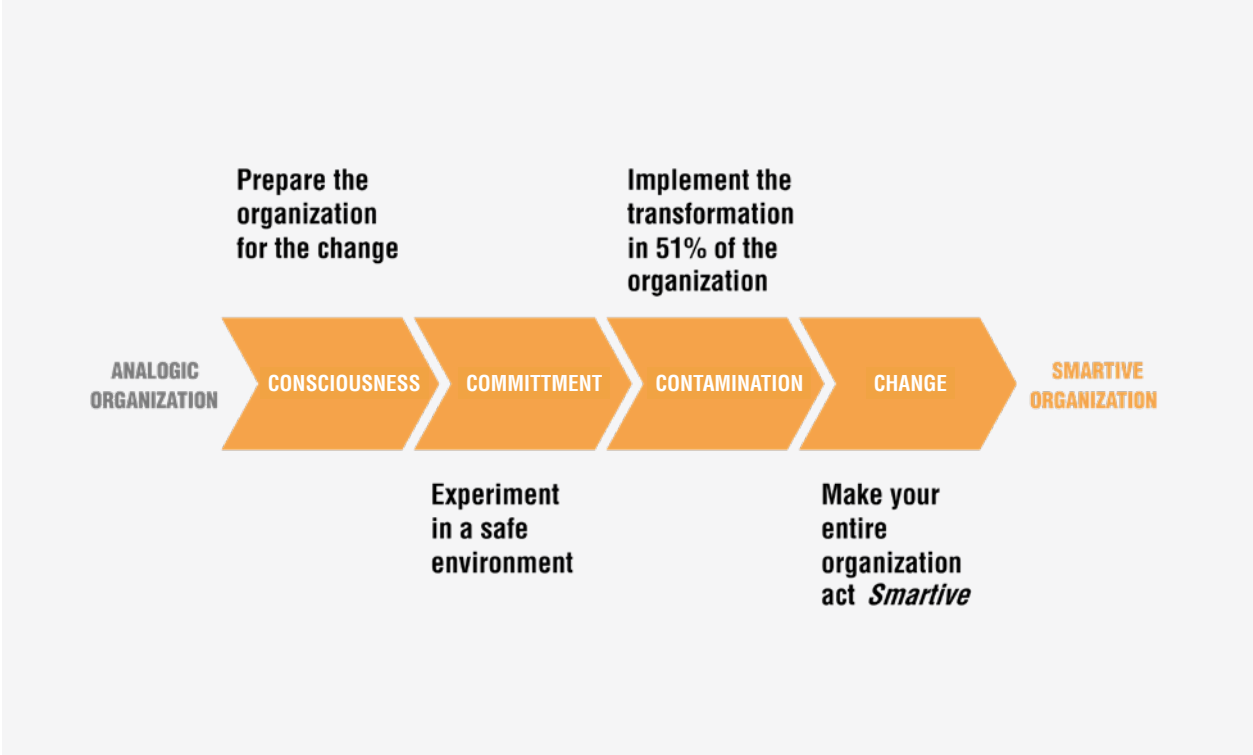
tion". Technology is only one of eight challenges in the Manifesto. The transformation is described as "open" because each company's experience is unique and open-ended; because part of the transformation, according to Smartive, is precisely to open up people, organisational units and the whole company to broader interactions, and also because Smartive staff engage in the process as experts, trainers and testimonials from other companies and institutions.

The presentation and discussion of these keywords with the top management and HR staff is typically the initial stage of Smartive's consultancy work in a company.

Smartive activities

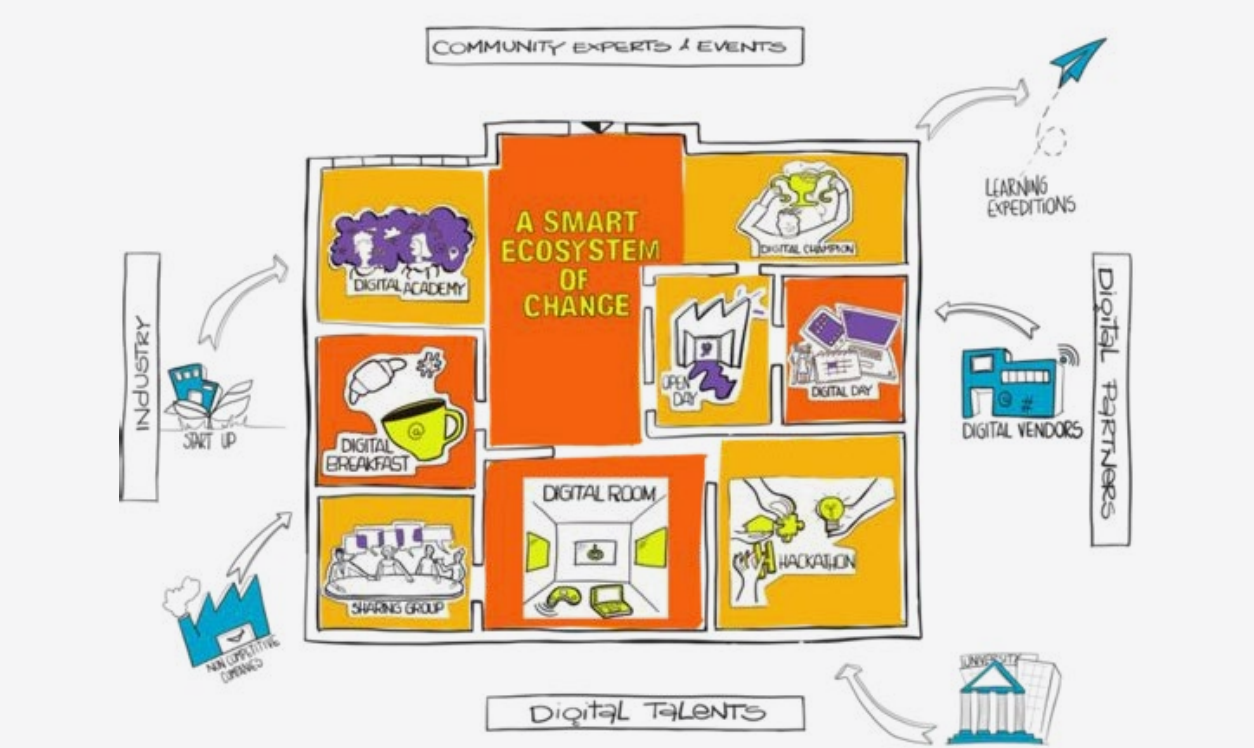
The full service offered by Smartive is described as an "Open Transformation Journey". The journey – named the "4C Journey" (**F.19**) – has the following four steps:

1. **Consciousness** is the initial step, during which time, Smartive maps the company's readiness to change and, based on this, designs the specific activities of the transformation journey;
2. **Commitment** is the crucial stage at which ideas for change are collected, transformed into small-scale actions, and tested through an agile approach. Some actions will inevitably fail (and this is to be expected),while others will succeed, and can then be scaled up;
3. **Contamination** is the process of scaling up successful initiatives and changes, to the point where at least half of the organisation is involved;
4. **Change** is the last stage which consolidates what is called a "smart ecosystem of change", which has been created throughout the previous steps. This aims at sustaining permanent, effective change processes across the whole organisation, whilst working closely with the broader external environment, including digital suppliers, industry partners, expert communities, talented individuals, and other potential human resources.



F.19 4C STEPS OF THE TRANSFORMATION JOURNEY

Throughout the initial mapping stage (within the consciousness phase), all employees are tested and mapped based on their openness to change, and their digital competence, using SmartiveMap. This allows Smartive to identify the so-called "digital champions", who can be immediately engaged in the change process, and to balance the subsequent actions undertaken throughout different stages of the journey. Such actions, called "formats", are events and activities de-



F.20 SMARTIVE "FORMATS" OR ACTIONS

signed to make things happen in the "company playground", as illustrated in **F.20**. Groups of actions which make up a segment of the journey are called "waves". Some actions mainly target top executives and managers, such as Sharing Groups and Digital Summits, to enhance awareness and sponsorship of the change actions. Others target specific staff clusters, and focus on learning, such as Digital Academy, Learning Expedition (out of the company visit), and Open Day (outside visitors to the company). Most formats are transversal, and tend to involve employees at all levels in variable aggregations, such as Digital Breakfast, Digital Day, Pilot project, Digital Room (co-working space), Hackathon, Digital Coaching, Reverse Mentoring, Talent Scouting, Partner Review, and others. Digital champions play a key role in many of these formats, as they are trained to train others and to motivate colleagues. A significant and continuous internal communication effort accompanies the whole process.

Smartive's clients so far have been mainly large companies, including ABB, Barilla, Bayer, Biogen, Cisco, Electrolux, Generali Group, Leroy Merlin, Foscarini, MSD, Piaggio, RCS Mediagroup, Sandoz, Siemens, Volkswagen Financial Services and EFSA, and the European Food Safety Agency.

Work with such customers will of course continue. The service offered is envisaged to evolve towards improving and maximising the users' levels of autonomy and experience, throughout their continuous learning journey. This will be done by creating a personal account on the Smartive platform (a sort of e-portfolio), which will also be available when the user moves to a new job, allowing them to track and document their learning experiences and achievements.

IMPLEMENTATION OF DIGCOMP

Smartive has been using DigComp at a technical level in the development and application of the SmartiveMap for analysis of skills in the labour market, and for skills assessments. At a general/strategic level, DigComp has acted as the reference framework used to introduce and discuss about digital competence with customers, and has been used to design workforce development activities as part of the digital transformation journey. DigComp is also used to identify some of the content for training activities, but this is currently done on a limited scale, as the main focus of Smartive's training on digital competence is closely related to organisa-

tional and work-related aspects (see below the discussion about functional competence), which are not directly addressed by the DigComp framework.

The SmartiveMap

SmartiveMap is the proprietary tool developed to assess and map the readiness of an individual and an organisation to the digital transformation. There is a standardised and simplified version freely available online, which is accessible from various devices (mobile, tablet or PC).

SmartiveMap uses two evaluation dimensions: openness to change, and digital competence. In the standard version, which focuses only on general digital competence, the user is asked to answer, during a 10 minutes session, 20 Likert-style and multiple-choice questions available in English or Italian. At the end of the self-assessment, SmartiveMap produces a personal report which includes the user's SmartiveMap profile, their scores, benchmark comparisons, and general advice about the role that the user can play in the digital transformation.

Based on the answers, SmartiveMap assigns one of these five profiles to each user:

- **Embracer:** has a positive attitude towards change, and a high level of digital competence. Can play a proactive role from the beginning of the change process
- **Confident:** has a good level of openness to change, and of digital competence, but still has to improve in order to play the role of an Embracer.
- **Ally:** usually accepts change, but needs to fill their gaps in technical competence and digital skills.
- **Sceptical:** has a technical background, but is hesitant about change, and needs to be engaged and taken on board.
- **Resistant:** is against change, needs to be identified, and carefully engaged and trained in a more advanced phase of the change process.

In its corporate version, the SmartiveMap test includes questions about the business function, each user's role in the organisation, and additional questions about the user's relevant functional digital competence. This version allows for company customisation.

Based on this overall data set, the company can use the SmartiveMap test results for the following:

- mapping employee profiles and their readiness to the digital transformation;
- finding talents and potential Digital Champions, who are usually Embracers with soft skills capabilities;
- planning targeted training and learning activities to overcome competence gaps;
- tracking the improvements of the ongoing digital transformation processes.

The individual attitude to change is measured both generally, and regarding some specific new activities, which are based on 10 Likert questions drawn from existing psychometric models to check resistance, openness, and commitment to change.

Two types of digital competence are considered: general and functional.

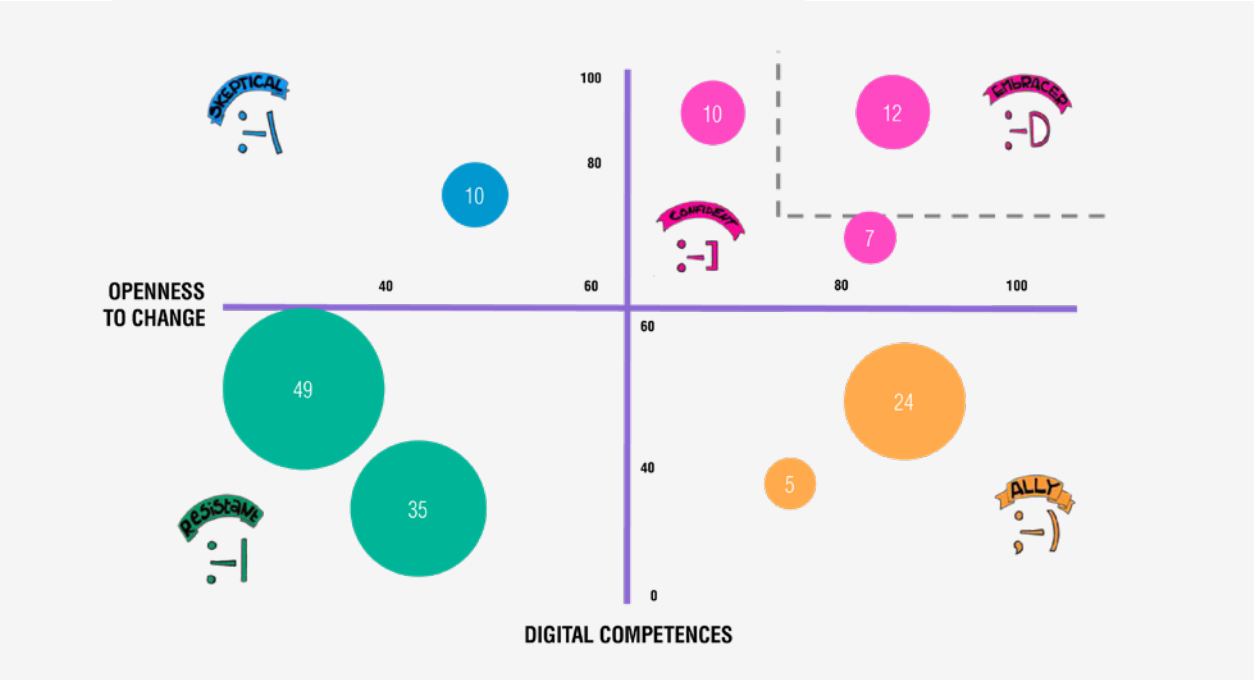
General digital competence refers to the level of awareness and confidence of the person in the digital environment. To define and measure this, Smartive used the DigComp framework 2.0, from which they selected descriptors of the 21 competences as the relevant dimensions for the assessment. SmartiveMap uses five multiple-choice questions (mostly from within DigComp's foundation and intermediate levels), to assess the level of general digital competence based on the percentage of correct answers.

A key decision taken in the design of SmartiveMap was to measure only the knowledge dimension of competence, i.e., "how much people know about common digital tools and services, and about DigComp's transversal issues such as security, privacy, etc.". Skills assessments were excluded, due to the difficulty of implementing them within a quick and self-administered testing tool. On the other hand, asking for a self-evaluation of skills – i.e. "How confident are you with doing x or y?" – was considered unreliable.

However, deeper competence analyses are conducted by Smartive within the corporate context, utilising follow-up interviews and focus groups. Observations from these activities have shown that the SmartiveMap's knowledge-based questions on general competence are generally effective for differentiating between those with higher and lower digital proficiency levels.

Functional digital competence refers to the level and type of digital competence required for specific functional areas of the company. Those currently covered by the SmartiveMap are: Finance and controlling; Marketing & Sales, Human Resources, ICT services, Operations and industrial services, Legal affairs, with a Research and Development area underway.

As DigComp does not address this type of job-related



F.21 CORPORATE SKILLS MAPPING WITH SMARTIVEMAP

digital competence, Smartive organised the definition of **digital functional profiles** using **SmartiveMap Editors**. This is a network of experts and digital managers from the various business functional areas, all of whom work for different companies and organisations. Firstly, these editors followed the DigComp framework to identify the most important areas of digital competence within each functional area. These areas were called "dimensions" in SmartiveMap, and were each given a short definition, and an overview of the main content-related topics. Secondly, the editors produced and validated a set of competence assessment questions for each topic. It is expected that these will require updating over time, to reflect the evolution of the digital challenges faced.

Using the digital functional profiles, the corporate version of the Smartive test includes questions about digital culture (DigComp-related questions), and functional expertise linked to the user's functional area, in five progressive levels of difficulty. Based ased on the results, the customer company receives a corporate skills mapping across different reports.

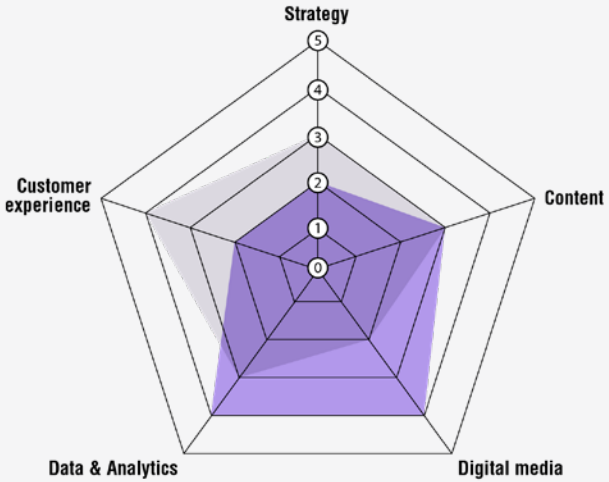
F.21 shows the general map of the five profiles (embracer, confident, ally, sceptical, resistant). Their size is presented as relative to the number of people within that group. SmartiveMap offers the function of filtering by different dimensions, allowing for an in-depth analysis of specific competence areas, and which employees and clusters of employees have greater competence gaps, facilitating the planning of subsequent training actions.

Smartive plans to develop a benchmarking service, which would provide HR managers and top executives with information about how the digital competence profile of their company (including an overview of all staff, and overviews of each functional area) compares with the average in the same business sector, as well as with the sector leaders. **F.22** shows an example for a marketing department.

The European Food Safety Authority (EFSA)'s transformation journey

To exemplify how the Smartive digital transformation approach can be implemented, a recent "journey" at the European Food Safety Authority (EFSA) based in Parma (Italy) is briefly illustrated below.

The EFSA journey began in April 2018; their main aim was to enhance their performance in a rapidly changing world, and in a context of a large network of external collaborators. The main focus, therefore, was on change management associated with the systematic introduction of collaboration tools (Office 365), starting with internal ones. The main focus of the journey is thus on change management associated with the sys-



F.22 BENCHMARKING EXAMPLE (MARKETING DEPT.)

tematic introduction of collaboration tools (Office 365), starting with internal ones.

The organisational environment of EFSA was new to Smartive, as most of the staff are scientists, whose functional digital competences, Smartive had never had the opportunity to study before. Due to that, the initial employee profiling step using SmartiveMap considered, both openness to change, and general digital competences. On average, EFSA's staff had higher levels of general digital competence than other organisations. Based on the profiling results for the five profiles (embracer, confident, ally, sceptical, resistant), Smartive designed a customised journey. This consisted of four training waves, each of which addressed approximately 100 employees with 12 classroom-based sessions, a Digital Champions program, an important internal communication campaign, and a few other minor activities.

Training sessions represented about 50-60% of the activities for EFSA's journey, in terms of the time devoted to them. They alternated between "how to" technology education (use of Skype for business, Microsoft Teams, and other topics) and digital culture sessions devoted to collaboration, safety, other DigComp competences, and the principles of the Smartive manifesto. The manifesto had been adapted to the scientific working environment within which EFSA operates. Training was mostly delivered face-to-face, in classroom-based settings, with an important peer education component involving both internal champions and external experts from the Smartive peers' community (professionals from other Smartive clients who were willing to share their expertise beyond their organisation's boundaries). Smartive's experience showed that classroom-based training was crucial for learning, particularly with regards to encouraging employees' engagement in the initial steps of the change process. In later stages, some of the training may be provided online. Full online training tends to be effective only for highly specialised topics and technical staff.

ONLINE RESOURCES

- The free SmartiveMap self-assessment test is available online in Italian and English. This version only considers the general digital competence dimension based on DigComp.
- The corporate self-assessment test has an extended set of questions about functional digital competences and several possible customizations for the Human Resources team to obtain a complete skills map of the company population.
- DigComp into Action Guide – see C18

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C8

A BAIT B PATHWAYS4EMPLOY

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The Basque Country has a well-established ICT knowledge certification system called IT Txartela, which has issued more than 250,000 certificates over ten years. The Basque Country government, through its Ikanos project (see **C3** Ikanos), asked Tecnalia, a private R&D organisation, to develop a new digital competence certification system, called BAIT, to be fully DigComp-based.

Tecnalia developed BAIT in collaboration with IVAP (the Basque Institute of Public Administration) and Mondragon University (which created the training offer). BAIT was tested by IVAP´s employees. In this process, Tecnalia benefited from its experience in the Pathways4Employ project, which used DigComp to define the digital profiles of entrepreneurs and virtual office workers, and developed a self-assessment test on related digital skills.

The use of DigComp has facilitated collaboration with local stakeholders and European partners, and dialogue with other Spanish regional governments that are also developing DigComp-based certification systems.

The case in brief

Leading organisation	**Fundación Tecnalia Research & Innovation**
Sector	Research Institution
Start / end date	2016 - ongoing
Geographical scope covered	Regional, Basque Country, Spain / European
Target audience	Employed • unemployed
Professional sectors covered	Public administration (BAIT) • business world (Pathways for Employ)
Employee profiles covered	ESCO 2422 Policy administration professionals • civil service administrative officer (BAIT) • Entrepreneur and Virtual office worker (Pathways for Employ)
Stakeholders involved	IVAP (Basque public institution) • Mondragon University
Online resources	BAIT self-assessment test Pathways4Employ self-assessment test DigComp into Action Guide – see C19
Tools	-
Contributors	Tecnalia - Iker Martínez de Soria, Juan Bartolomé Boloix, Digital Trust Technologies Area (TrusTech), ICT Division

LMI skilling functions provided

(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓ A B
Outreach to under/ unemployed	
Careers advice	✓ B
Personal development plan	✓ B
Design and development of training	✓ A
Delivery of training	
Workforce development	
Assessment of skills	✓ B
Certification of competence	✓ A B
Liaising with employers for job placement / experience	
Job search support	
Client tracking and monitoring	
Employee support	

CONTEXT AND DRIVERS

In 2002, the Basque Country developed an ICT knowledge certification system called IT Txartela, which over the last 10 years issued over 250,000 certificates out of 500,000 exams, to about 80,000 Basque citizens in all sectors of society. In particular, IT Txartela certificates (supervised by IVAP, the Basque Institute of Public Administration) have been increasingly important to successfully apply for a public administration job, as some public entities have made IT Txartela mandatory for some jobs, and others a 'merit' in job applications.

IT Txartela reflects the traditional approach to ICT skills development and validation, by certifying operational knowledge in computer solutions: Microsoft and Open Office, web browsers, operating systems, internet, email, etc., providing over 72 different certifications. This has also been the prevailing approach followed until recently in ICT training, for instance by the public KZgunea telecentre network and by IVAP.

As part of the Ikanos broader government initiative under the Basque Government's Digital Agenda 2015 to enhance digital skills in all sectors of Basque society, and in light of the new vision for digital competence brought up by the DigComp framework, the Basque government decided to promote an evolution of the IT Txartela system towards a new evaluation and certification system, BAIT. BAIT, which is an acronym for "Validate your digital competences!" in the Euskera language, is intended to implement a fully competence-based approach, in line with the European Digital Agenda and the DigComp framework. Along with the new system, of course, a renewed training offer on digital competence needed to be developed.

The change of certification system, and its application starting with the public sector (an important employer in the Basque economy), would signal to all citizens the direction to take in the development of digital competence in the coming years.

Tecnalia and the BAIT project

Fundación Tecnalia Research & Innovation is a private, independent, not-for-profit applied research centre with an international reputation. Tecnalia is the leading research and technology organisation of its kind in Spain, and one of the largest in Europe, employing 1,400 people (258 PhDs) and owning over 250 patents. For more than 15 years, Tecnalia has been the Basque Government´s key partner for using IT Txartela to evaluate and certify the ICT knowledge of those citizens who want to get accreditation in order to apply for a public job.

In 2016, Tecnalia was contracted by SPRI, the Basque government's business development agency, to design the new BAIT system. The project involved collaborating with Mondragon University, which created the training offer to develop the new competences, and with IVAP, the main employer of civil servants working in the Basque government and administration (7000 employees), and the first beneficiary of BAIT itself.

The project strategy for BAIT was to start deploying the new evaluation and certification system and the related training offer within the public sector. The aim was to enhance the digital competence of civil servants (starting with IVAP's employees), and, more importantly, to enhance the employability of citizens who want to apply for a Public Administration job and need to get their digital competence accredited for that purpose. The plan in the future is to open up BAIT to any interested citizen.

The BAIT project was developed into several steps, which are illustrated in detail below:

- identifying the target group;
- analysing the target group's digital competence requirements;
- based on the gaps in the current training offer compared to DigComp, identifying the need for new courses;
- developing eight new courses (for the moment), addressing seven DigComp competences (two courses address the Netiquette competence at two different proficiency levels);
- launching online delivery of training;
- developing the new evaluation and certification system;
- testing the BAIT system on the eight new courses with 143 public workers.

By the end of 2018, other Basque public entities such as the Basque Public Health System (Osakidetza), Lantik, whose mission is to Plan and Implement the Information Systems Policy of the Regional Government, and the Informatics Centre for Bilbao Council (CIMUBISA), showed an interest in using the BAIT system.

BAIT adopts new digital competence validation methods and certification procedures to include the digital knowledge and skills that people are increasingly acquiring outside the formal learning environment. These changes will not affect the current IT Txartela

processes leading to certification, which are familiar to Basque citizens and include using KZgunea telecentres' sites, and their assistance. For some time, IT Txartela and BAIT will coexist to allow a smooth transition and avoid resistance from stakeholders and citizens to adopting the new system. In the future, however, BAIT may incorporate some IT Txartela components (e.g. by integrating some modules devoted to specific software programs).

IMPLEMENTATION OF DIGCOMP

The implementation of DigComp was a natural choice for the BAIT project, as BAIT was launched as part of the IKANOS project (see **C3** Ikanos) precisely to develop a new digital certification system which was fully DigComp-compliant. The staff from Tecnalia Digital Competence research area were already aware of and knowledgeable in DigComp.

Target group and competence needs

The first step in the project was to identify the target user groups for the new system. The Human Resources staff of IVAP proposed focusing on administrative staff (auxiliarios administrativos and administrativos), as this is a segment of the public workforce for which digital skills have always been necessary, and for which transversal digital competences are particularly important. Other public occupations, such as the managers of administrative staff, by contrast, require specialist digital skills.

The next step, which was performed in collaboration with KZGunea, the main training provider, included analysing the training courses currently delivered to public administrative staff in the light of DigComp's five areas and 21 competences. This analysis showed that there were several DigComp competences which were almost totally overlooked by existing courses, and a close analysis was performed with IVAP of the corresponding DigComp 2.1 descriptors at different proficiency levels, in order to assess their relevance for public administrative workers. This process led to the decision that, while all competences would be addressed sometime in the future, BAIT would start with eight of them: seven at foundation and one at intermediate level (see **T.24**).

T.24 LIST OF DIGCOMP COMPETENCES NEEDED BY PUBLIC ADMINISTRATIVE STAFF

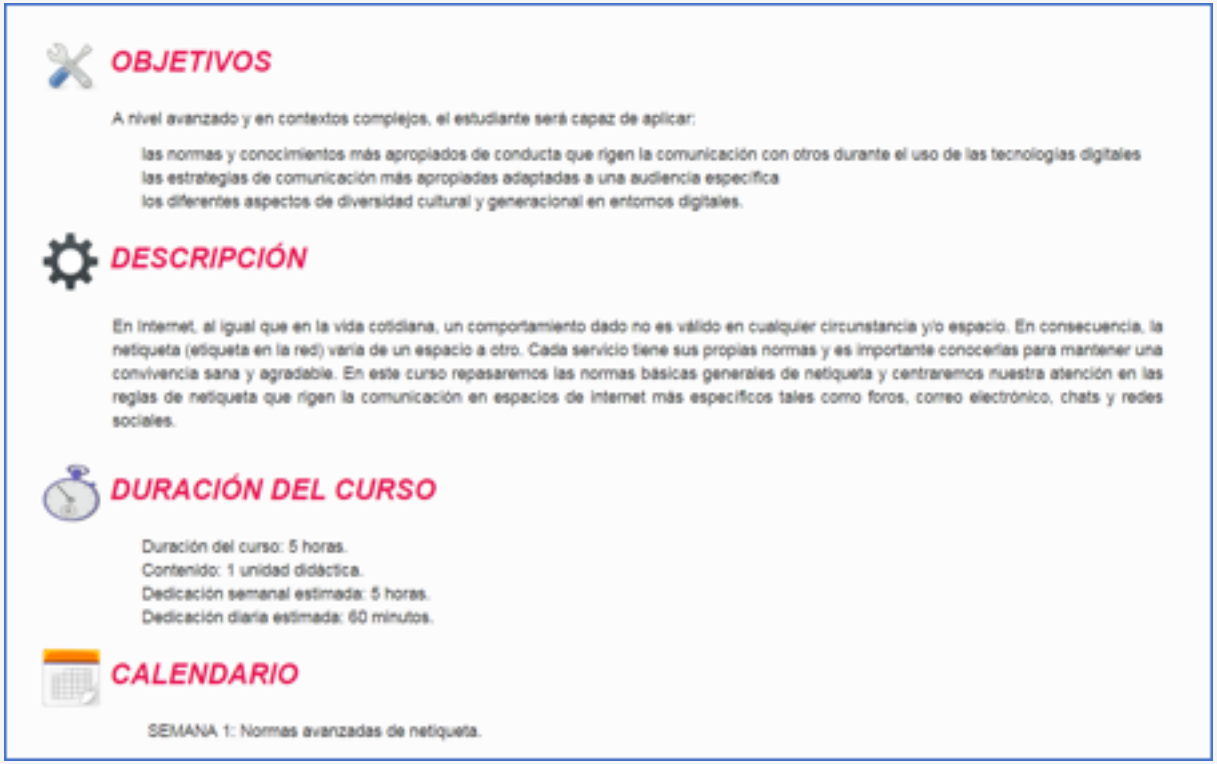
DIGCOMP AREA	DIGCOMP COMPETENCE	PROFICIENCY LEVEL
Communication and Collaboration	2.5 Netiquette	Intermediate
	2.6 Managing digital identity	Foundation
Digital Content Creation	3.4 Programming	Foundation
Saftey	4.1 Protecting devices	Foundation
	4.4 Protecting the environment	Foundation
Problem Solving	5.1 Solving Technical Problems	Foundation
	5.3 Creatively using digital technologies	Foundation
	5.4 Identifying digital competence gaps	Foundation

At the time of analysis, IVAP considered that their public employees did not need advanced proficiency levels in the competences. The analysis also led to some additional items not explicitly mentioned by DigComp descriptors being identified to be included in the new courses and evaluation (typically concerning specific tools, such as knowledge of Microsoft Word).

Training design

Based on the results of this analysis, Mondragon University, in collaboration with IVAP and Tecnalia, launched the design and development of the courses for the chosen competences and proficiency levels.

Each course is clearly related to a DigComp competence and proficiency level. **F.23** presents the Netiquette intermediate course and shows how DigComp descriptors are used to define the objectives of the course. Over time, it is envisaged that courses will be developed for all DigComp competences at all three proficiency levels (except for some advanced courses which are not rele-



F.23 PRESENTATION OF NETIQUETTE INTERMEDIATE COURSE

vant to this target group, e.g. programming).

The training was delivered on IVAP's e-learning (Moodle) platform. Although in its initial phase the training offered mostly "theoretical" content, with limited practical activities, further development was planned.

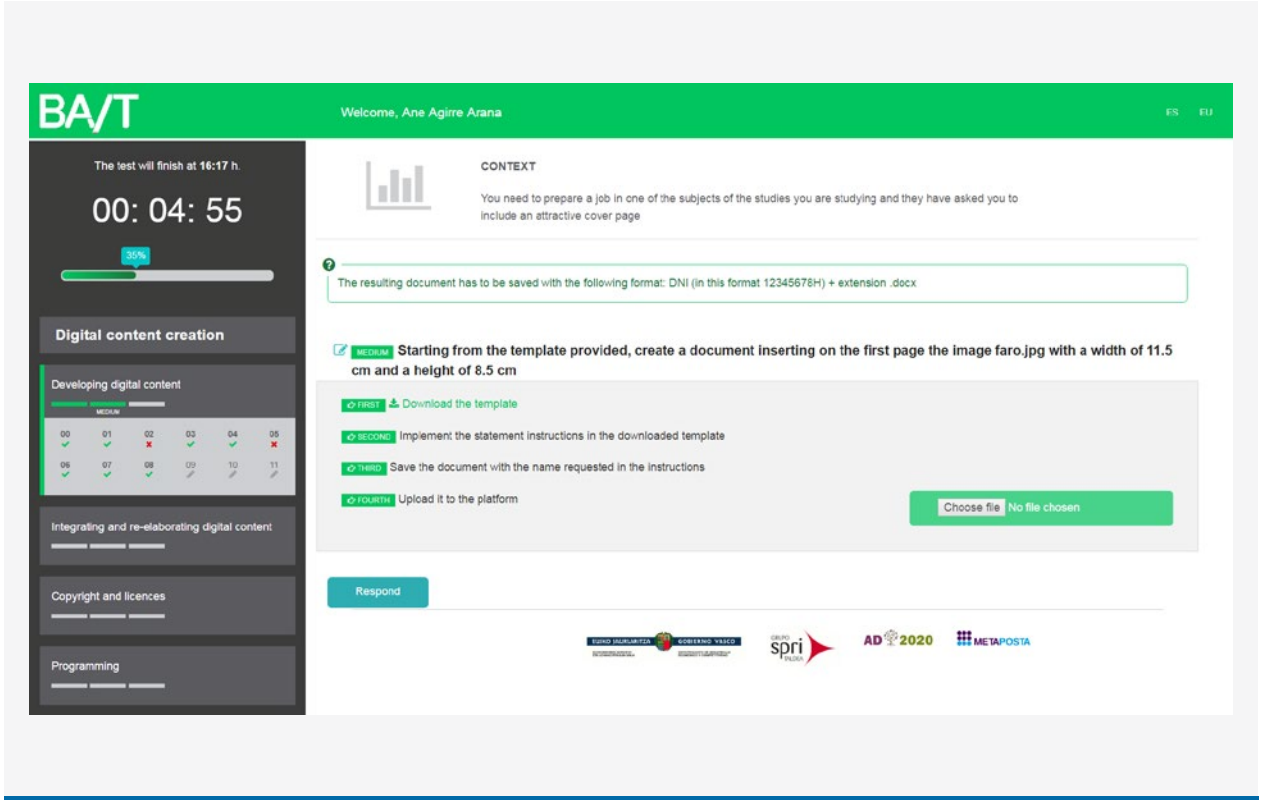
At the time of this analysis (end 2018), the training was accessible only to IVAP employees. The training offer was promoted through a targeted marketing video which clearly refers to and values BAIT's DigComp inspiration and explains briefly but very clearly what DigComp is about.

In November 2018, 143 public workers started the courses, which lasted approximately five hours each and were expected to be followed for one hour per day, or one course per week, during working hours. At the end of the training, all learners took the new BAIT test.

The BAIT evaluation system (C8A)

As soon as the design and content of the courses was defined, Tecnalia took the training material as a reference point to define the evaluation items and develop the overall evaluation system. The BAIT model and platform for evaluation and certification of digital competence has the following initial characteristics, which may evolve based on feedback from its usage:

1. **Performance-based assessment**: the evaluation is based on the user's performance on a wide variety of digital challenges that have to be solved and that are aligned with DigComp's competence descriptors. **F.24** shows an example of a task that requires the user to create a new document file, to download and insert an image in the first page, set a given size for the image, save the file etc.
2. **Exercises in real-world situations**: the evaluation reflects situations that users will face in a professional context. Real tools (e.g. word processor, spreadsheets) must be used to accomplish assessment tasks, but tests are designed to be solved without knowledge of a particular tool. For instance, the test presents tasks that can be performed in any word processor (as in **F.24**), such as setting new margins for a page, increasing the spacing within a table cell, or modifying the "Title" style of a file.
3. **Summative evaluation and verification**: the test must be carried out in a limited time and under supervision to ensure compliance with regulations.



F.24 EXAMPLE OF BAIT TEST ITEM - AUTHENTIC TASK

Tests can be taken at KZgunea and other approved centres. Users obtain a digitally signed certificate sent to a MetaPosta account, the highly secure webmail service of the Basque Country.

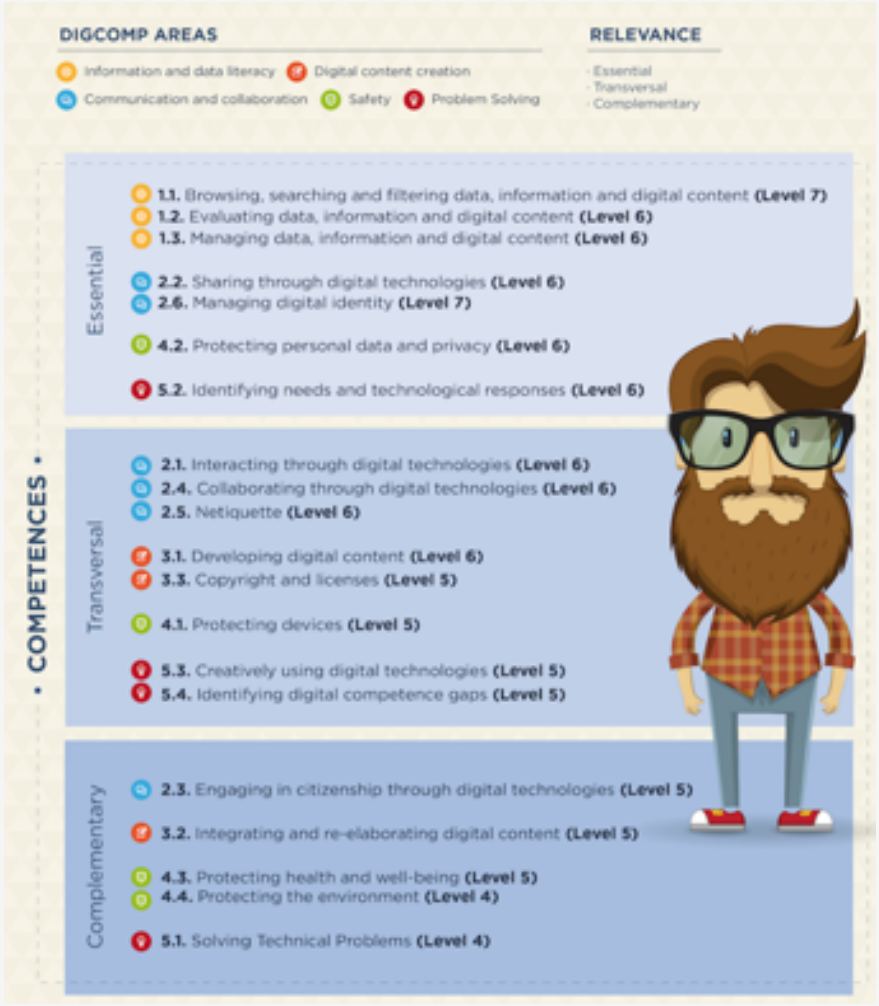
4. **Evaluation with technological support**: the tests are carried out through a web platform including a web page for users to manage test registration, another web page giving access to test execution, and administrative access to manage the certification platform.
5. **Users automatically receive feedback** and are able to visualise their progress during the test. Moreover, user history is updated automatically after the test is completed.
6. **Evaluation analytics**: the information gathered from the tests is used to improve the system itself.
7. **Adaptive assessment:** test implementation is designed to provide the same precision in results with a shorter test version, which may be needed to avoid boredom/frustration and to reduce test duration for some user categories.

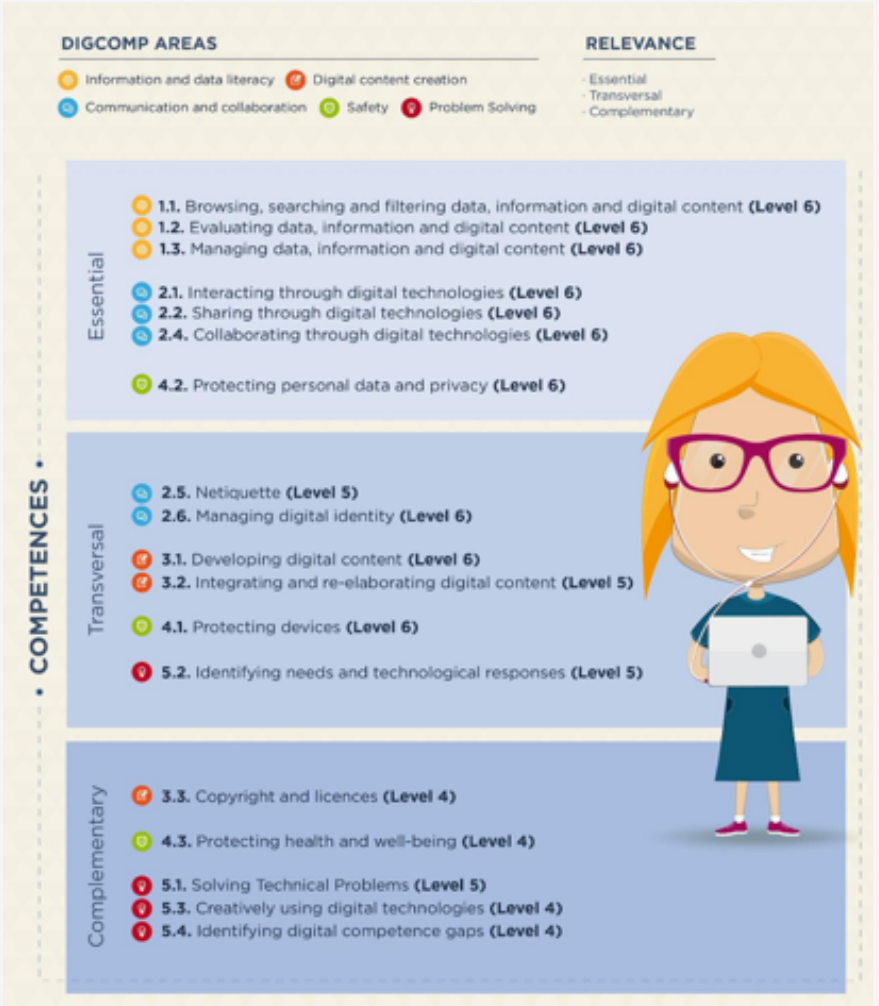
Following the successful test of the new evaluation system, which produced certificates for the first 128 public workers, BAIT will be used as the main tool for evaluating and certifying the digital competences of administrative staff in IVAP.

Pathways for Employ (C8B) – DigComp and EntreComp

In 2016-18, in parallel with the first stages of BAIT implementation, Tecnalia participated as partner to the Erasmus+ Pathways4Employ project (budget of €172,000), which developed a system for the assessment and accreditation of the digital competence needed to be an entrepreneur or virtual/mobile office worker.

In this project, DigComp and EntreComp were first used as reference frameworks for the questions of two online surveys which were carried out in order to understand what digital competences are needed by anyone who would like to work remotely or become an entrepreneur, regardless of the activity field. Drawing on a survey distributed to about 150 practitioners throughout Europe, two Professional Digital Profiles were designed. The profiles list the DigComp competences and related proficiency levels required, classified by relevance (as essential, transversal or complementary). They were finally validated through an expert workshop. **F.25**





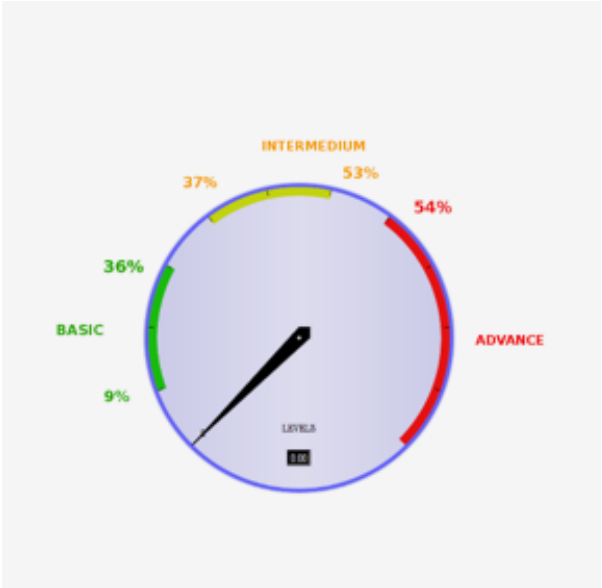
F.25 ENTREPRENEUR AND VIRTUAL OFFICE WORKER PROFILES IN PATHWAYS4EMPLOY

shows the resulting profiles for the entrepreneur and the virtual office worker.

Accreditation pathways were also designed for both competence profiles, with the aim of issuing open badges (or digital certificates to be downloaded). Users must obtain the five badges linked to the five digital areas based on DigComp to obtain a profile badge. This badge can be attached to their CV in Europass, in the digital competence section. In turn, the badge for each area requires them to obtain the digital competences and levels defined for that area in the profile in question.

Based on the pathways, Tecnalia developed an online platform to perform competence assessments, and implement the accreditation system. The assessment modules include knowledge, ability and attitude aspects aligned with DigComp's five areas and 21 competences. The test modules represent situations and tasks that frequently need to be overcome in real life. Users' answers produce an assessment result in terms of basic, intermediate and advanced levels, as detailed in **F.26.**

In Pathways4Employ, the test for each digital competence includes three knowledge questions (basic, intermediate and advanced), one attitude question and one skill question requiring users to perform some practical tasks. The responses to the attitude questions do not count in the final grade (they are only for statistical purposes). The skills questions are the most difficult ones, and their grade is higher. The level achieved by test respondents for each digital competence is defined according to the scale in **F.26**. A score below 9% is defined as INITIAL level.



F.26 PROFICIENCY LEVELS IN PATHWAYS4EMPLOY TEST

Users are allowed to take the different tests as many times as they wish, and their personal digital profile will be updated accordingly.

More than 1,000 users from the partner countries and other countries tested the platform. Users were both experts in digital skills and "real" users who wanted to know their level of digital skills. 88% of them would most likely recommend this platform, which is considered by the partners as a positive indicator of the project's outcome. For Tecnalia, Pathways4Employ was also an opportunity to deepen its understanding and application of DigComp and to learn from its implementation.

ONLINE RESOURCES

- The BAIT self-assessment test can only be taken by registered users and, for the moment, all the resources are only for internal use at IVAP.
- The Pathways4Employ self-assessment test is freely available online, after registration, in English, Spanish, Basque/Euskara, Latvian and Greek). The Pathways4Employ web platform is available for re-use by interested third parties, taking into account the partners' IPR in the software.
- DigComp into Action Guide – see C19

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C9 ADECCO'S COMPETENCES DICTIONARY

ITALY & GLOBAL

Adecco Group Italia is the largest private employment agency in Italy, providing workforce solutions and a wide range of related services, primarily to business customers and to people seeking employment and/or new opportunities for their professional career. To deliver such services in the best possible way, it is crucial to understand, anticipate and effectively respond to the rapid evolution of both "soft" and "hard" competences required in the changing workplace, as impacted by the digital transformation.

Three areas of activity within The Adecco Group illustrate how this is done: Assessment Solutions, training services by Mylia, and the new PHYD platform for employability support from a lifelong learning perspective. DigComp and EntreComp have not been used in these activities until now, but the recent revision of the Adecco's Competences Dictionary, which is used in assessment activities, includes digital and entrepreneurial competencies inspired by the two European frameworks.

The case in brief

Leading organisation	**Adecco**
Sector	Commercial
Start / end date	2014 - ongoing
Geographical scope covered	National, Italy & Global
Target audience	Employed • unemployed
Professional sectors covered	Employed • unemployed • enterprises
Employee profiles covered	-
Stakeholders involved	-
Online resources	Technimetro® PHYD platform
Tools	-
Contributors	Nadia Cristofoli, head of Adecco Assessment Solutions Department Mariangela Lupi, head of Adecco Humanity Development and Educational Department Pasquale Lovino, business scouting manager, Mylia Manlio Ciralli, CEO of Advancing Humanity srl and Managing Director of Phyd Sara Toticchi, EU funding manager

LMI skilling functions provided

(✓ when DigComp is used, ✓ when not)

Labour market skills analysis	✓
Outreach to under/ unemployed	
Careers advice	✓
Personal development plan	✓
Design and development of training	✓
Delivery of training	✓
Workforce development	✓
Assessment of skills	✓
Certification of competence	
Liaising with employers for job placement / experience	✓
Job search support	✓
Client tracking and monitoring	✓
Employee support	✓

CONTEXT AND DRIVERS

In this case study, we illustrate three areas of activity carried out by Adecco and affiliated organisations: the activities of Adecco Assessment Solutions Department, the training services of Mylia, the new brand of Adecco Formazione, and the employability support to individual customers provided by the new PHYD platform, developed by a spin-off of Adecco Italia Group (henceforth Adecco), and launched in March 2019.

These activities show how these organisations address the rapidly changing competence requirements of organisations, with a specific and primary focus on behavioural soft skills, but also including hard skills and IT competences.

Adecco's core business: Workforce solutions

Adecco is the leading private employment agency in Italy and its main activities are workforce solutions and related services offered to private companies and other organisations to meet the demand for qualified work. Adecco's contact point in the customer organisation for these services is normally the HR department in larger organisations, or the person(s) in charge of recruitment and staff management in smaller organisations. To carry-out this activity, Adecco develops customised solutions based on a) the needs of candidates, and b) the needs of the work environment and market sector in which they are or will be placed.

Selection and Recruitment: candidates are first evaluated and selected using various methods such as individual interviews and tests to define their skills and gaps to be filled. These may then receive individual assessment, ad hoc training courses, career advice, professional relocation and/or career transition services. After Selection and Recruitment, Adecco's **Candidate Management Process** involves the Matching function with vacancies in customer organisations, and the subsequent Management phase, which is aimed at guaranteeing the employee's professional continuity and development.

Adecco operates in Italy through a network of about 400 branches across the country, with approximately 2000 professionals, and through its web portal, where candidates can upload their CVs, check for job offers, and establish contact with Adecco services staff.

Adecco's main Workforce solutions for companies include temporary or permanent provision of **Staff Leasing**, whereby Adecco hires workers on a temporary or permanent job contract, who then work in a client company. The remuneration and contractual treatment of workers on these contracts is at least the same as those of employees at the same level and with the same job tasks in the company in which they work. The **Apprenticeship** solution provides young (fifteen- to twenty-nine-year old) permanent staff with an important component of training-for-employability.

Adecco also offers related support such as the **On-Site Management service of its own staff**, for those client organisations with a large number of Adecco employees. Another service is the **Skill Licence scheme**,

T.25 ADECCO'S WORKFORCE SOLUTIONS

SOLUTIONS FOR THE CANDIDATES/EMPLOYEES	SOLUTIONS FOR CUSTOMER ORGANISATIONS
Selection and Recruitment services Evaluation and selection Individual assessment Ad-hoc training Career advice Profesional relocation Career transition	**Workforce solutions** Staff leasing Aprenticeships
Candidate Management Process Job Matching function On-the-job monitoring and after care	**On customer site Adecco's staff management solutions**
	Skill Licence scheme
	CV Basket
Alternanza scuola-lavoro (ASL)	

which consists of the assessment by client companies of a worker's soft skills. This is done using a short online questionnaire focused on relational skills, reliability, flexibility, personal growth, perseverance, respect for roles and rules, motivation and work performance. Another service, the **CV Basket**, offers client organisations personalised 24-hour access to a pool of constantly updated CVs, filtered based on analysis of their previous relationships with Adecco.

Finally, Adecco also carries out specific activities with **schools and students**, mainly in relation to the school-work alternation scheme "*Alternanza scuola-lavoro (ASL)*", which since 2015 has been extended to all schools. These activities aim to enhance students ' knowledge of the world of work and the opportunities it offers, and to develop a positive relationship with these potential future customers.

Adecco Search and Selection services and Assessment Solutions

Adecco offers Search and Selection services for customer companies that need help in identifying and attracting, or internally moving, the best candidates for specific vacancies, or in anticipating future organisational needs. :

For these activities, Adecco relies on about 380 experts in candidates selection operating in local branches, which are supported by 100 consultants (one for every three to four branches), who are fully dedicated to assessing and recruiting qualified and specialised staff. An additional team of over 100 senior consultants or Assessors, experts in selection and assessment tools and processes, are involved in the execution of assessment projects with customers.

All these activities are supported by Adecco's **Assessment Solutions** Department (henceforth Assessment Solutions), which acts as a central service specialising in assessment tools and methods. Assessment Solutions operates under the broader Humanity Development and Educational Department of The Adecco Group.

Assessment Solutions works on the assumption that assessing the skills of external candidates and of the internal staff of a company is crucial to selecting and managing the most suitable professionals for positions which contribute to the company's full development. Based on this knowledge, Assessment Solutions has several aims:

- to facilitate business creation and evolution by developing people;
- to help people get to know themselves better;
- to promote innovation in companies and stimulate change in people;
- to seek wellbeing for the company by working on the wellbeing of people; and
- to identify people's potential and recognise their talent.

In practice, Assessment Solutions works as a service for the whole Adecco Group and also directly with external customers, with the following lines of activities:

- Through the **Assessment Centre**, iit assesses and selects new candidates that are requested by Adecco local branches and by consultants from other Adecco Group's entities, when these need specific assessment of new candidates' soft skills, as part of the Search and Selection services provided to client companies that are looking for specific talents to replace existing staff or recruit new staff;
- Through the **Development Centre**, it assesses client organisations' internal resources for different purposes: career mapping and planning, talent scouting, succession planning, role changing, professional growth, competences mapping and change management.
- Through the **People Development**, it designs so-called "Models of techno-behavioural competences" which identify in detail the soft skills and level needed for a given professional role, define how to measure them, and identify the competence development paths which should be followed in order to address the competence gaps found in candidates.

Assessment Solutions runs these activities through **assessment and development projects** responding to clients' needs, and relies on two groups of professionals for that. One is the national **Competency Centre**, a team of five experienced work psychologists dedicated to designing assessment processes and mapping the skills, abilities, attitudes and motivation of workers. The other is the aforementioned team of over 100 professional **Assessors** dedicated to implementing the projects designed with the Competency Centre.

How does this work in practice? All Adecco branches carry out soft/behavioural competence analyses as part of the candidate selection process, and often use the competence dictionary discussed below for this purpose. They then propose an assessment path to the customer/candidate, both from selection and development perspectives. If the customer/candidate is interested, Assessment Solutions supports them in designing and executing the needed steps.

Skills assessment and the move towards DigComp and EntreComp

The assessment of a candidate is based on the job profile agreed with the client. In the past, job descriptions focused primarily on the **tasks** that a person should be able to perform. Given the constant evolution of work organisation, tasks, and technological tools used at work, the job profile of qualified occupations has evolved, focusing increasingly on the "hard" **skills** needed to perform the technical tasks, and on the "soft" skills needed to perform the job effectively and efficiently, and to deal with its constant, rapid evolution. Adecco started addressing these (soft) skills in a structured way six years ago, using behaviour, motivation and competence analysis tools with a dedicated team.

The job requirements for technical tasks and related hard skills are normally specified by the client organisation, and can be verified using the candidate's CV and technical certifications, and by administering technical tests. Soft skills, however, are more difficult to identify and assess, and this is where Assessment Solutions' expertise and services come in.

A key tool supporting this activity is **Adecco's Competences Dictionary**. Its first version was created in 2014 in Spain and was then brought to Italy, and used in these two countries. A new version was prepared in 2018 by Adecco headquarters (Zurich, Switzerland). The first Dictionary included 23 soft skills (as illustrated below) and for each of them, it provided a list of indicators that should be observed and measured, both during ordinary selection activities in Adecco's branches, and during those activities carried out within Assessment Solutions projects. The Dictionary was created to

T.26 ADECCO'S COMPETENCES DICTIONARY

VERSION 2017	VERSION 2018
Adaptability to change	Adaptability to change
Learning and innovation	
Self-control	
Involvement, commitment and responsibility	
Communication	Communication
Decision making	Decision making
Change management	Change management
Resource management	Resource management
Cultural identification	
Impact & influence	
Initiative & Autonomy	Initiative
Motivation, optimism and energy	
Customer orientation	Customer orientation
Result orientation	Result orientation
Quality orientation	Quality orientation
Planning and organisation	Planning and organisation
Strategic planning	
Problem solving and analysis	Problem solving and analysis
Searching for information	
Development of business opportunities	
Resource development	Resource development
Team working	Team working
Global vision	
	Entrepreneurial spirit
	Digital skills

promote a map of professional roles that included both technical and behavioural aspects, and to provide an objective and uniform tool, that could be used/shared with customers as a shared reference model for the definition of each job.

The Dictionary's content, purpose and user´s guide have been the object of an intense internal training activity delivered to the whole Adecco network, in particular to the staff in charge of selection activities.

Digital competence was not included in the initial Dictionary and therefore it was not addressed systematically in the soft skills assessment activities performed ordinarily by selection staff in Adecco's branches. However, different types and levels of IT skills (e.g. knowledge of Office productivity tools, programming languages, etc) are often included in job profiles and are assessed in candidates.

The new release of the Competences Dictionary, however, aims at addressing the needs brought by the current digital transformation and its wide and deep impact, as illustrates the following quote from the Introduction of the new Dictionary:

> *"In a context marked by sudden changes due to the digital transformation, competences remain at the centre of any organizations' needs. These competences are no longer fixed but are subject to continuous updates: in people, as well as in the companies, the concepts of upskilling and reskilling become fundamental. The new Dictionary of behavioural skills aims to consolidate our leadership in human resources evaluation through a shared and contemporary language. The Adecco Group has always been an absolute reference in terms of skills: that's why we have given a new look to our dictionary, introducing digital competences and reorganising the previous ones. This renewed tool will help us to consolidate our partnership with customers, through a shared language in line with the times".*

The new version of the Dictionary has fifteen competences, which include digital competences articulated into DigComp's five areas, entrepreneurship, and spirit of initiative.

In addition to this evolution, the **digital transformation can also be observed within Adecco's organisation itself**. Within the past two years, most of the assessment tools used within and for assessment processes have been digitalised. Each assessment path designed by Assessment Solutions is based on the use of three to four tools for observing behavioural skills, as agreed with the client. The range of tools used is very varied, including those to investigate personality, motivation, attitudes, and behaviours (mostly through using questionnaires), paper-based and PC-based business games, assessing group dynamics based on free or assigned roles, role-playing, one-to-one simulations, and self-presentations with varying levels of interaction. Moreover, Adecco has a proprietary online platform on which technical tests, aptitude tests, and behavioural questionnaires are administered. There are several external partners, who administer all of the aforementioned questionnaires, as well as a specific partner for the gamification tool.

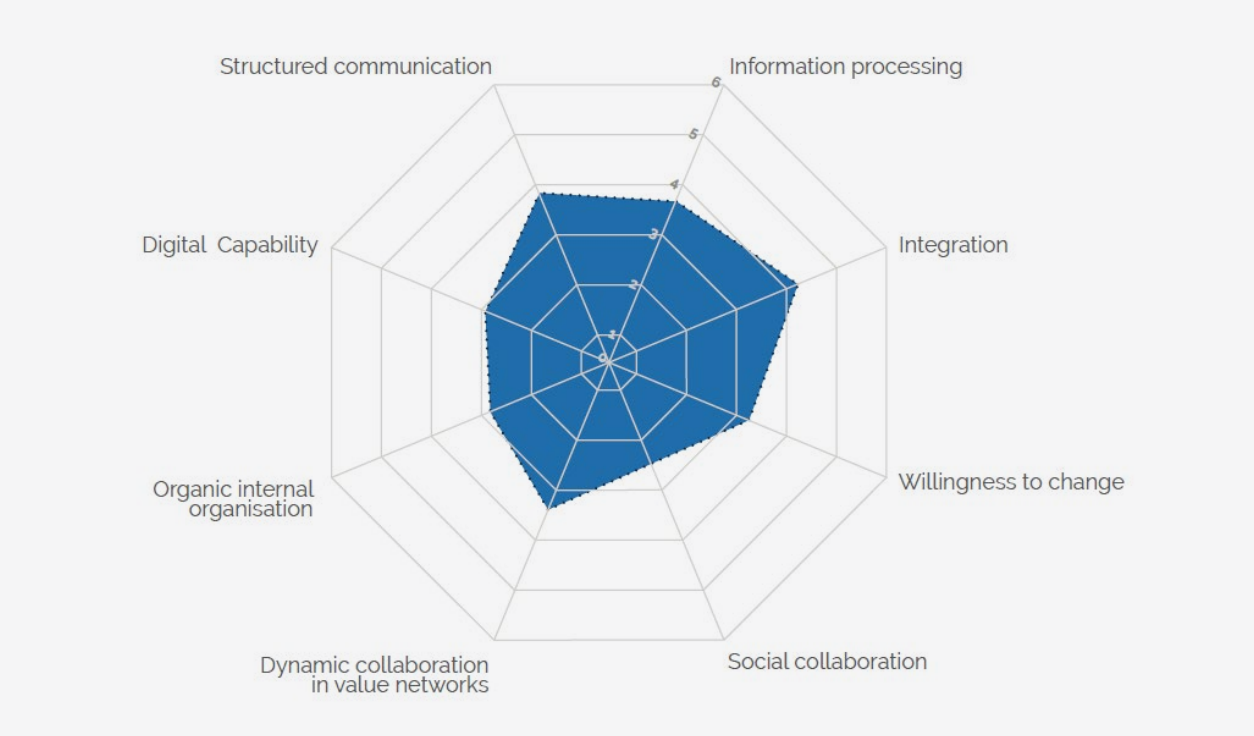
Adecco Formazione and Mylia

Adecco Formazione was founded in 2001, with the aims of improving the employability of Adecco's individual customers, and meeting the staff training demands of business customers and public administrations, through the provision of training. Mylia is a new brand of Adecco Formazione which was created in 2018, and is currently present in most Italian regions, with seventeen local offices. To deliver its services, it relies on one-hundred-and-fifty internal resources, and over two-hundred teachers and partners.

Over the years, Adecco Formazione has developed training services in response to the evolution of and changes in the business world, which have increasingly been characterised by VUCA features (volatility, uncertainty, complexity and ambiguity), and the challenges that these pose to both strategic management and the management of human resources.

Most recently, Adecco Formazione has placed specific attention on developing knowledge of the Industry 4.0 transformation, stimulated by the Italian digital agenda and industrial policies. To further strengthen the experience gained in this area, Adecco Formazione formed the Mylia brand in 2018, whose mission is to further corporate learning, personal development, and executive training. Since 2018, it has developed a particular specialisation in the macro-sectors which are particularly important in the Italian context, including banking and insurance, life sciences, luxury, fashion and retail, and public administration.

Mylia's initial step with a client is to analyse the organisational context. In this activity, Mylia training designers use a proprietary tool called Management Practices Board, which helps them to gain an understanding of the organisation's key features, and their related training needs. The Management Practices Board allows training designers to describe and analyse the manag-



F.27 EXAMPLE OF VARIABLES INCLUDED IN THE DIGITAL MATURITY TEST (Source: Courtesy of Fondazione Giacomo Brodolini)

ers' organisational behaviour and, if needed, to extend the mapping to the behaviours of teams within the entire organisation. This tool, however, does not allow for the analysis of any specific skills at an individual level (though such analysis can be performed by Adecco's Assessment Solutions department).

Mylia uses two new innovative and complementary tools, one of which is the Digital Maturity Test, which measures the digital readiness and maturity of the organisation. The second of these tools is Technimetro®, which identifies whether the client's field of business is already showing signs of emerging relevant skills, stemming from the digital transformation of the client's business field are present, or more likely, might be developed among its existing human resources.

The Digital Maturity Test measures the degree of the company's maturity. It is an adapted version of the reference roadmap of organisational transformation towards Industry 4.0, developed in the Acatech Study (2012-2013), by the German National Academy of Science and Engineering in Munich and the German standard Din Spec 91345:2016 - Reference Architecture Model Industrie 4.0, developed by Fondazione Brodolini and the Pisa University.

The test identifies which of the company's business areas and functions are most critical from the digital transformation perspective, and helps with identifying the company's competence gaps, and competence development needs. The test is performed by Mylia assessors, using interviews which are typically held with those in the client company who are in charge of human resources, IT, quality, and production. An example of the key variables addressed by the test, and the visual report produced is shown in **F.27**. The test does not directly assess individuals' skills, digital or otherwise, but rather asks interviewees whether given digital skills are available or not.

Technimetro® was also developed by Fondazione Giacomo Brodolini and Erre Quadro, in collaboration with Pisa University. This tool uses semantic analytics and other big data techniques to analyse scientific literature databases, as well as patents which are undergoing registration, to predict the evolution of the needs for both digital and non-digital Industry 4.0-related hard skills. Such a strategic tool provides answers to companies' questions about the development of their digital competences. These questions are typically sectoral, i.e. reflect the situation of the technologies in-use, and which are emerging in the company's business sector. The companies also need advice on recommended training aligned with, and possibly anticipating, the key evolutionary trends of their business sector, so as to

have their staff equipped with the right skills at the right time.

There is not yet a reference framework of digital competence for Industry 4.0 which is at the same time dynamic, has predictive capacity, and can be deemed "solid" enough (by which we mean that it is not based on extrapolations or generalisations of models developed in or for specific contexts). However, according to Mylia, Technimetro® is considered a good step towards that goal.

Mylia started applying Technimetro® semantic analytics to the CVs of existing staff, and to the job profiles and any other additional information which a company may have about their staff's Industry 4.0-related hard skills. If a company has a good description and monitoring system of its internal competences, this approach is very effective. Where this is not the case, some direct competence assessment of staff might be needed, for which Mylia relies on Adecco's Assessment Solutions support. The result of this activity is a detailed map of the company's current competence situation (the "as is" picture), which is compared with the Technimetro® results about competence trends (the "to be" picture) in the company's reference business sector(s).

Using the aforementioned maps of managers' and key staff members' organisational behaviours, and of the Industry 4.0-related hard skills situation, Mylia builds a customised training and development programme to support the company's digital transformation.

Mylia's Learning Solutions, the training which is offered to business customers, is articulated in three broad areas:

1. **Digital** - covers data analytics, social organisations (online collaboration and sharing, using social media with customers, etc), programming and cybersecurity.
2. **People** – covers mainly soft skills.
3. **Abilities** – focuses on upskilling staff members and/or employability, and addresses hard skills in the main business functions such as Sales and Marketing, Production (smart manufacturing, rapid prototyping, etc.), and Supply chain.

Mylia uses a simplified version of the ESCO labels in its online presentation of the competences and skills which are developed by Learning Solutions. Of these labels, three skills are related to the DigComp framework:

- **Evaluating information** (linked to DigComp 1.2) as transversal and generic skill is defined as important skill for Data analytics, R&D and Innovation, Human Resources and People Intelligence;
- **Solving technical problems** (linked to DigComp 5.1) as transversal and generic skill is defined as important skill for Production operation and Supply chain;
- **Adopting digital citizenship** (linked to DigComp 2.3)is associated with Programming. This interesting association is based on Adecco Formazione's experience that shows that an intensive and well-designed training course on programming methods and languages represents for many young unemployed people the fastest and safest way to find a job and, through that, to become an active participant in our digital society, hence digital citizenship.

Several skills mentioned especially within the People Learning Solutions are related to the EntreComp framework competences, such as creative thinking, spotting opportunities, acting entrepreneurially, leading, motivating and persuading others, and use learning strategies.

The PHYD Platform

PHYD is the name of a project carried out by Advancing Humanity srl (an independent entity spun off from and controlled by Adecco Italia Group to create and develop the PHYD project and platform). It aims to support people (any individual, but with a focus on people with tertiary education) to evaluate, maintain, and increase their employability, in a life-long learning perspective.

The support uses dedicated algorithms to provide a sequence of steps and services which account for the individual's background, their level of hard and soft skills, existing vacancies in the labour market, and the ESCO repertoire of occupations and related skills. These steps are as follows:

1. The user is offered to take a self-assessment test of his/her soft skills.
2. The user can select a profession (this may be their current profession or a new role which they would like to pursue). The list of jobs to choose from is derived from ESCO.
3. Depending on the profession selected, the platform offers the user an additional test which assesses their level of transversal hard skills important for that job. For example, a financial accountant will need to know about Excel, accounting principles, the Intrastat model, etc. The list of skills and competences associated with a profession is also derived

from ESCO.

4. The results of the previous steps (assessments of soft and transversal hard skills) are compared with the benchmark of skills required within the chosen profession. This benchmark is created by labour market analysts, and is updated every six months based on online job advertisements within that industry/profession. The comparison indicates to the user the distance between his/her skills and those required for the target job.
5. Following the skill gap analysis, the platform suggests the best training courses that can help the user with filling in any gaps to increase his/her employability with respect to the target job. Some courses require payment, while others are free. The courseware selected automatically from those offered by over 40 MOOCs of PHYD partners.

The PHYD platform was released to the public in March 2019, and is open to anyone free of charge.

For the time being, no specific framework or taxonomy of digital competence has been used in the development of the content or the functions of the platform. However, the future development of the platform is envisaged as a continuous, adaptive, and open process, and the PHYD project manager considers that such a framework might be useful in that process.

Innovation through EU Funding

Within The Adecco Group, there is a team devoted to the development of European projects on core topics for the Group. The team operates on all levels by designing and supporting projects in collaboration with the Group's different legal entities, such as Mylia, Adecco Corporate, Modis, Fondazione Adecco, etc.

Among the topics addressed by recent projects are:

- Fast-track integration of the labour market for migrants and refugees
- Employability and inclusion within the labour market
- Digital skills and skills mismatch
- Engineering R&D

Thanks to the EU funding activities, the Group holds a European position and collaborates on these issues with stakeholders of excellence from the world of research and industry, participating in technical tables and innovative projects.

The team is currently investigating specific opportunities, such as utilising Adecco's dataset and knowledge of the labour market (both on an individual level and company level) to carry out predictive analyses of skills needs. They are also working in collaboration with academic partners to define methods of skills analysis and profiling. Another opportunity which the team are investigating is whether it would be feasible to align internal platforms (such as PHYD) with European standards and tools (such as DigComp, and projects such as Compass), in order to make an active international contribution to the labour market.

Other themes considered for upcoming projects are related to analysing emerging professions which are arising as a result of technological innovation and industrial and societal transformations. The results of such analyses will be linked to the priorities of the European digital agenda, and Smart Specialisation Strategy. The intention is to contribute to the identification of new profiles (e.g. data scientist, cybersecurity expert, AI expert), and the standardisation at an EU level of related skills which respond to the real needs of businesses.

ONLINE RESOURCES

- Technimetro®
- PHYD platform

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