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DigComp 2.0: The Digital Competence Framework for Citizens

*Update Phase 1:
The Conceptual Reference
Model*

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Abstract

DigComp 2.0: The Digital Competence Framework for Citizens.

The European Digital Competence Framework for Citizens, also known as DigComp, offers a tool to improve citizens' digital competence. DigComp was first published in 2013 and has become a reference for many digital competence initiatives at both European and Member State levels. This document introduces DigComp 2.0. It constitutes phase 1 of the update of the framework which focuses on the conceptual reference model, new vocabulary and streamlined descriptors. The current document also gives examples of how DigComp is used at the European, national and regional levels.

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Preface

The European Commission's Communication "A new skills agenda for Europe: Working together to strengthen human capital, employability and competitiveness" proposes ways to address the skills challenges that Europe is currently facing. The aim is for everyone to have the key set of competences needed for personal development, social inclusion, active citizenship and employment. These competences include literacy, numeracy, science and foreign languages, as well as more transversal skills such as digital competence, entrepreneurship competence, critical thinking, problem solving and learning to learn.

The European Digital Competence Framework for Citizens¹, also known as DigComp, offers a tool to improve citizens' digital competence. In the fields of education and training, and employment, there was a need to have a common reference framework of what it means to be digitally savvy in an increasingly globalised and digital world.

DigComp was developed by the Joint Research Centre (JRC) of the European Commission as a scientific project based on consultation with, and active input from, a wide range of stakeholders and policy makers from industry, education and training, employment, social partners, etc. The project originated in DG Education and Culture and was further developed on behalf of DG Employment, Social Affairs and Inclusion. It was first published in 2013 and has become a reference for the development and strategic planning of digital competence initiatives at both European and Member State levels. However, as the digitalisation of our society, work and education is moving fast, there is a need to update the concepts and vocabulary of the DigComp framework. The current document, DigComp 2.0, presents Phase 1 of the update, which focuses on the conceptual reference model. The report also showcases examples of its implementation at the European, national and regional levels.

The origin of this work goes back to 2006 when the European Union proposed 8 key competences for lifelong learning, one of which was Digital Competence.

DG Employment, Social Affairs and Inclusion is working with JRC IPTS to strengthen the uptake and use of DigComp in Europe. DigComp 2.0 and the first report on a "European entrepreneurship competence framework" (EntreComp)² are being published at the same time. Both tools will enable public authorities and private actors to improve their guidance, training and mentoring services for citizens, young people and job seekers. We believe they can help address some of the key skills challenges that Europe is currently facing.

Detlef Eckert,
Director, DG Employment, Social Affairs and Inclusion

¹ <https://ec.europa.eu/jrc/digcomp>

² <https://ec.europa.eu/jrc/entrecomp>

Executive summary

Policy context

The Europe 2020 Strategy aims to create the conditions for smart, sustainable and inclusive growth. Some of the areas it targets are employment, education, social inclusion and poverty reduction. Each of these areas is changing fast through the digitalisation of our society. People need digital competence to be able to participate and benefit from digital opportunities - but also to mitigate possible risks. This is clearly a challenge that must be addressed today. Almost half (44.5%) of the EU population aged between 16 and 74 has insufficient digital skills, as demonstrated by the EU-wide Digital Economy and Society Index (DESI) indicator on "digital skills", based on 2015 Eurostat data³.

Boosting digital skills is one of the European Commission's priorities. Its most recent proposals have been put forward in the Communication "A New Skills Agenda for Europe: Working together to strengthen human capital, employability and competitiveness".

Key conclusions

The *Digital Competence Framework for Citizens*, also known as DigComp, was first published in 2013 by the European Commission. It is a tool to improve citizens' digital competence, help policy-makers formulate policies that support digital competence building, and plan education and training initiatives to improve the digital competence of specific target groups. DigComp also provides a common language on how to identify and describe the key areas of digital competence and thus offers a common reference at European level.

This report presents version 2.0 of the *Digital Competence Framework for Citizens* (Phase 1). It consists of an update of the conceptual reference model, a revision of the vocabulary and more streamlined descriptors. Examples of how DigComp is used at the European, national and regional levels are also provided.

Main findings

From 2013 up until now, DigComp has been used for multiple purposes, particularly in the context of employment, education and training, and lifelong learning.

This report outlines these implementations in three main areas: 1) policy formulation and support; 2) instructional planning for education, training and employment; and 3) assessment and certification. More than ten examples of these implementations in Member States are listed in the report in order to give an overview of the current uses of DigComp.

Additionally, DigComp has been put into practice at the EU level, for example to construct a European-wide indicator called "Digital skills" which is used to monitor the Digital Economy and Society. Another example is incorporated into the Europass CV enabling jobseekers to evaluate their own digital competence and include the evaluation in their Curriculum Vitae.

Furthermore, new frameworks have been derived from DigComp for new contexts where digital competence is needed. In collaboration with the Directorate-General for Justice and Consumers, the JRC is working on *the Digital Competence Framework for Consumers* (DigCompConsumers) to help consumers to participate actively, safely and assertively in the digital marketplace. The JRC is also working on the *Digital Competence Framework for Teachers* (DigCompTeach) on behalf of the Directorate-General for Education and Culture.

³ <https://ec.europa.eu/digital-single-market/desi>

Related and future JRC work

After the publication of the DigComp 2.0 conceptual reference model (Phase 1), the JRC will continue working on Phase 2 of the update. This will include further refining the DigComp proficiency levels for the 8 levels of learning outcomes, which will be validated in the course of 2016. The JRC will also continue to monitor the implementation of the DigComp framework at regional and national levels (see Implementation Gallery⁴) and ensure that it is up-to-date and policy relevant in the future.

Additionally, the JRC is developing related competence frameworks in the fields of education and training, employment and lifelong learning. Examples of this work include the Entrepreneurship Competence Framework (EntreComp⁵) and the European Framework for Digitally-Competent Educational Organisations (DigCompOrg⁶).

⁴ <https://ec.europa.eu/jrc/en/digcomp/implementation>

⁵ <https://ec.europa.eu/jrc/en/entrecomp/>

⁶ <https://ec.europa.eu/jrc/en/digcomporg>

1. Introduction

In 2015, almost half (44.5%) of the EU population aged from 16 to 74 had insufficient digital skills to participate in society and economy.⁷ In the active labour force (employed and unemployed), this figure is more than a third (37%). 12% of young Europeans aged from 11 to 16 were likely to be exposed to cyberbullying - a number that has increased from 2010⁸. Work, employability, education, leisure, inclusion and participation in society - all of these areas and many others in our society are being transformed by digitalisation. Consequently, digital competence - or the confident and critical use of ICT tools in these areas - is vital for participation in today's society and economy (European Parliament and the Council, 2006).

The *Digital Competence Framework for Citizens*, also known by its acronym DigComp, was first published in 2013 by the European Commission. It aimed to be a tool to improve citizens' digital competence, to help policy-makers to formulate policies that support digital competence building, and to plan education and training initiatives to improve digital competence of specific target groups. DigComp also provided a common language on how to identify and describe the key areas of digital competence and thus offered a common reference at European level.

From 2013 up until now (2016), DigComp has been used for multiple purposes, particularly in the context of employment, education and training, and lifelong learning. However, the fast moving digitalisation of various aspects of society sets new requirements, hence the need for DigComp version 2.0.

In this report, we outline the two-phase update process of DigComp 2.0 (Section 2). We then introduce the first phase of the update, presenting the DigComp conceptual reference model with its 21 updated competence descriptors (Section 3). Section 4 familiarises the reader with the new vocabulary and details all the changes to the competence titles and descriptors. Finally, in Section 5, we present a number of examples of implementations at national and European level to illustrate the variety of uses.

The *Digital Competence Framework for Citizens* uses a multi-stakeholder governance model in which DG Employment, Social Affairs and Inclusion and JRC-IPTS lead the management and quality assurance. A cross-Directorate-General (DG) governing mechanism allows other relevant DGs to be involved, namely DG Education and Culture (EAC) with whom DigComp was initially launched, DG for Communications Networks, Content and Technology (CNECT); DG for Internal Market, Industry, Entrepreneurship and SMEs (GROW); and DG for Justice and Consumers (JUST). This cross-DG governance plays an important role in ensuring complementarity between existing and emerging actions (e.g. e-Skills for growth and jobs, Digital Single Market, ESCO, etc.). There is also further collaboration with a wider set of external stakeholders such as national authorities, interest groups (e.g. DIGITALEUROPE⁹, eSkills Association¹⁰, Telecentre-Europe¹¹, ECDL¹²) and other key players. For example, other digital competence frameworks, such as the European e-Competence Framework for ICT Professionals¹³, and training providers have been involved in the process of updating the current framework to version 2.0.

⁷ DESI indicator on "digital skills", 2015 Eurostat data: <http://digital-agenda-data.eu/datasets/desi/indicators>

⁸ EU Kids Online (2014): findings, methods, recommendations. EU Kids Online, LSE. <http://eprints.lse.ac.uk/60512/>

⁹ <http://www.digitaleurope.org/>

¹⁰ <http://eskillsassociation.eu/>

¹¹ <http://www.telecentre-europe.org/>

¹² <http://www.ecdl.com/>

¹³ <http://www.ecompetences.eu/>

2. The two-phase update process

The *Digital Competence Framework for Citizens* is structured in four dimensions. Dimension 1 and 2 represent the DigComp *conceptual reference model* (see Table 1 – grey background). The process of updating DigComp is advancing in two phases. This document describes Phase 1: the update of the “conceptual reference model” - in other words, updating the competence areas, the competence descriptors and their titles.

Table 1: Main dimensions of DigComp 2.0.

Dimension 1:	Areas identified to be part of the digital competence
Dimension 2:	Competence descriptors and titles that are pertinent to each area
Dimension 3:	Levels of proficiency for each competence
Dimension 4:	Examples of the knowledge, skills and attitudes applicable to each competence

Phase 1 of the update has three main objectives: to update the vocabulary, to streamline the competence descriptors by reducing redundancy, and to include relevant updates regarding EU legislation (e.g. EU data protection reform¹⁴). The rest of the framework will be updated and validated during the course of 2016 (see Figure 1). This will include an update of proficiency levels to include 8 levels of learning outcomes (Dimension 3) and examples of knowledge, skills and attitudes (Dimension 4).

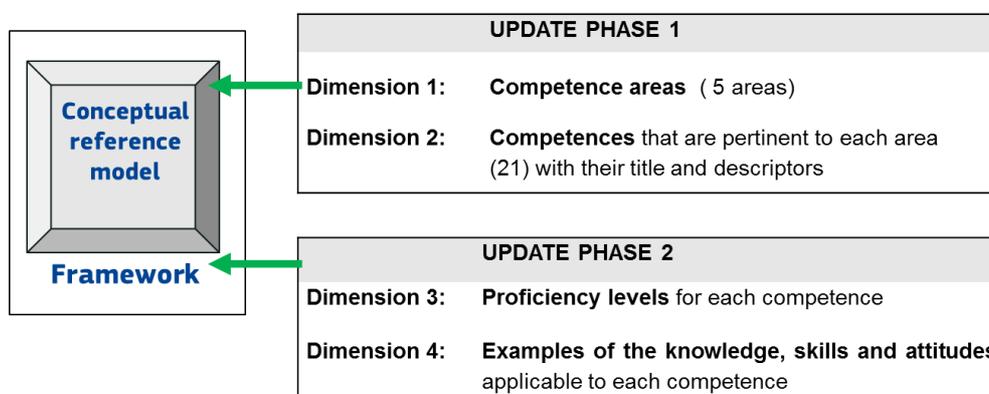


Figure 1: The two-phase process to update the DigComp Framework to version 2.0.

The process of updating DigComp started in early 2015 with feedback from the Education and Training 2020 Working Group for Transversal Skills¹⁵. In three separate sessions (February, June and October 2015), feedback was gathered on the different parts of the update process (e.g. use cases at the national level, proficiency levels, conceptual reference model). The ET 2020 Working Groups are part of the Open Method of Coordination, a way for the European Commission and Member States to cooperate in addressing key challenges at national and European levels in the field of education. Their engagement in implementing DigComp is important, as will be shown in Part 5 where a number of examples are given at regional, national and EU-levels. It is also worth

¹⁴ http://europa.eu/rapid/press-release_IP-15-6321_en.htm

¹⁵ See more about ET 2020 Working Groups here: http://ec.europa.eu/education/policy/strategic-framework/expert-groups_en.htm

mentioning that the Thematic Working Group that focused on *ICT and Education* had already endorsed version 1.0 of the Digital Competence Framework for Citizens.

In November 2015, a fairly stable version of the DigComp 2.0 conceptual reference model was made publicly available on the JRC Science Hub¹⁶ with a deadline for feedback of 15 March 2016. Throughout that period, feedback was gathered using different means, e.g. interviews, emails, consolidated feedback from Ministerial working groups, external reviewers. Moreover, during the annual "Governance of the EU digital competence and entrepreneurship competence frameworks" in February 2016, the stakeholders were made aware of the update and asked for their feedback.

¹⁶ <https://ec.europa.eu/jrc/digcomp/>

3. DigComp 2.0 - the Conceptual Reference Model

In this section, we present the updated conceptual reference model for the Digital Competence Framework for Citizens. These changes are explained and discussed in the following section.

Competence areas	Competences
Dimension 1	Dimension 2
1. Information and data literacy	<p>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.</p> <p>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.</p> <p>1.3 Managing data, information and digital content To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.</p>
2. Communication and collaboration	<p>2.1 Interacting through digital technologies To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.</p> <p>2.2 Sharing through digital technologies To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices.</p> <p>2.3 Engaging in citizenship through digital technologies To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.</p> <p>2.4 Collaborating through digital technologies To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of resources and knowledge.</p> <p>2.5 Netiquette To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.</p> <p>2.6 Managing digital identity To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.</p>

<p>3. Digital content creation</p>	<p>3.1 Developing digital content To create and edit digital content in different formats, to express oneself through digital means.</p> <p>3.2 Integrating and re-elaborating digital content To modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.</p> <p>3.3 Copyright and licences To understand how copyright and licences apply to data, information and digital content.</p> <p>3.4 Programming To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.</p>
<p>4. Safety</p>	<p>4.1 Protecting devices To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy.</p> <p>4.2 Protecting personal data and privacy To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a “Privacy policy” to inform how personal data is used.</p> <p>4.3 Protecting health and well-being To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.</p> <p>4.4 Protecting the environment To be aware of the environmental impact of digital technologies and their use.</p>
<p>5. Problem solving</p>	<p>5.1 Solving technical problems To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).</p> <p>5.2 Identifying needs and technological responses To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility).</p> <p>5.3 Creatively using digital technologies To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.</p> <p>5.4 Identifying digital competence gaps To understand where one’s own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.</p>

4. From DigComp 1.0 to DigComp 2.0

The *Digital Competence Framework* was first published in 2013 by the Institute for Prospective Technological Studies of the European Commission's Joint Research Centre. In this section, we explain the changes that took place in Phase 1 of the update concerning the conceptual reference model which is composed of the competence areas, competence titles and their descriptors.

4.1. DigComp 2.0: new vocabulary and streamlined descriptors for better scoped competences

Since the first publication in 2013, the digital evolution has re-written itself with new needs and requirements, which are reflected in a fast changing vocabulary. Even though the DigComp framework is a rather high-level conceptual reference framework, it has become clear that some vocabulary needed to be updated. This is independent of changes in the functionalities of the tools, software and apps as such, and aims to reflect more abstract changes at the conceptual level. The glossary of the new terms is introduced in Table 2.

<p>Content in different formats = e.g. text document, graphics, images, video, music, multimedia, web-pages stored using a standard file format, 3D printing (either proprietary, free and/or open). For more, see: https://en.wikipedia.org/wiki/List_of_file_formats</p> <p>Data = a sequence of one or more symbols given meaning by specific act(s) of interpretation. Data can be analysed or used in an effort to gain knowledge or make decisions. Digital data is represented using the binary number system of ones (1) and zeros (0) as opposed to its analogue representation. (sources: https://en.wikipedia.org/wiki/Data_%28computing%29; http://www.thefreedictionary.com/data).</p> <p>Digital communication = communication using digital technology. Various modes of communication exist, e.g. synchronous communication (real time communication, e.g. using skype or video chat or Bluetooth) and asynchronous ones (not concurrent communication, e.g. email, forum to send a message, sms) using for example, one to one, one to many, or many to many modes.</p> <p>Digital content = any type of content that exists in the form of digital data that are encoded in a machine-readable format, and can be created, viewed, distributed, modified and stored using computers and digital technologies, e.g. the internet. The content can be either free or pay content. Examples of digital content include: web pages and websites, social media, data and databases, digital audio, such as mp3s, and e-books, digital imagery, digital video, video games, computer programmes and software.</p> <p>Digital environment = a context, or a "place", that is enabled by technology and digital devices, often transmitted over the internet, or other digital means, e.g. mobile phone network. Records and evidence of an individual's interaction with a digital environment constitute their digital footprint. In DigComp, the term digital environment is used as a backdrop for digital actions without naming a specific technology or tool.</p> <p>Digital services (public or private) = services that can be delivered through digital communication, e.g. internet, mobile phone network that might include delivery of digital information (e.g. data, content) and/or transactional services. They can be either public or private, e.g. e-government, digital banking services, e-commerce, music services (e.g. Spotify), film/tv services (e.g. Netflix).</p> <p>Digital technology = any product that can be used to create, view, distribute, modify, store, retrieve, transmit and receive information electronically in a digital form. For example, personal computers and devices (e.g. a desktop, laptop, netbook, tablet computer, smart phones, PDA with mobile phone facilities, games consoles, media players, e-book readers), digital television, robots. Modified from source: http://www.tutor2u.net/business/ict/intro_what_is_ict.htm.</p>

Digital tools = digital technologies (see: digital technology) used for a given purpose or for carrying out a particular function of information processing, communication, content creation, safety or problem solving.

Privacy policy = the term related to the protection of personal data, for example, how a service provider collects, stores, protects, discloses, transfers and uses information (data) about its users, what data are collected, etc.

Problem solving = “an individual’s capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such situations in order to achieve one’s potential as a constructive and reflective citizen” (OECD, 2014).

Well-being = the term is related to the WHO definition of good health as a state of complete physical, social and mental well-being¹⁷, and not merely the absence of disease or infirmity. Social well-being refers to the sense of involvement with others and with the communities (e.g. access and use of social capital, social trust, social connectedness and social networks).

Social inclusion = the process of improving the terms for individuals and groups to take part in society (the World Bank¹⁸). Social inclusion aims to empower poor and marginalized people to take advantage of burgeoning global opportunities. It ensures that people have a voice in decisions which affect their lives and that they enjoy equal access to markets, services and political, social and physical spaces.

Structured environment = where data resides in a fixed field within a record or file, e.g. relational databases and spreadsheets.

Technological response/solution = refers to the attempt to use technology (and/or engineering) to solve a problem.

Table 2: Updated vocabulary for DigComp 2.0

In the new vocabulary, for example, instead of talking about being “online” or “the use of ICT”, a catch-all term “digital environment” is used to describe the backdrop to digital actions. In this case, it is not necessary to name a specific technology or tool and therefore, the term encompasses not only the use of personal computers (e.g. a desktop, laptop, netbook or tablet computer) but also other hand-held devices (e.g. Smart Phones, wearable devices with mobile networking facilities), games consoles, media players or e-book readers which, more often than not, are also networked and/or connected to the internet.

Moreover, new requirements for digital competence have resulted from the digital transformation. Compared to 2013, for example, it is now more common to use cloud-based storage to store data and digital content than before. Also, data literacy has become more and more necessary thanks to new information visualisation tools and larger amounts of data available. Other important updates relate to accessibility and social inclusion. Privacy and legislation regarding personal data have also moved on since DigComp version 1, to mention just a few of the updates related to emerging trends (for more details, see Annex 1).

In addition, the demand for workers who can solve problems at the workplace has evolved and increased. More and more, these problems arise in technology-rich environments. So, on the one hand, there is a need for people who can assess needs and/or existing problems and come up with a solution using digital tools and technologies. On the other hand, there is a need for people who can use digital technologies to create new knowledge and to innovate processes and products that did

¹⁷ http://www.who.int/features/factfiles/mental_health/en/

¹⁸ <http://www.worldbank.org/en/topic/socialdevelopment/brief/social-inclusion>

not exist before. Therefore, the competence descriptors in the area of “Problem solving” have been updated to emphasise problem solving as part of digital competence. Moreover, the DigComp 2.0 conceptual reference model is now also aligned with the OECD definition of problem solving.

PISA 2012 defines problem-solving competence as: ...an individual’s capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such situations in order to achieve one’s potential as a constructive and reflective citizen (OECD, 2014, p.30).

Regarding the conceptual updates, the name of the competence area previously known as “1. Information” was changed to “1. Information and data literacy”. This is an important alignment which makes the link between information literacy and DigComp more visible and explicit. Like the UNESCO’s work on Media and Information Literacy (UNESCO, 2011), which brings together the fields of Information and Media literacy as “a combined set of competencies necessary for life and work today”, DigComp 2.0 encompasses the main components of Information Literacy and parts of Media Literacy (see Annex 2 and Annex 3 for more details on mapping between UNESCO frameworks and DigComp).

Additionally, there was a need for the DigComp reference model to better focus on the current demand for citizens to have a better understanding of programming and coding. A plethora of international, EU-level and national initiatives has focused on the issue recently (e.g. Balanskat & Engelhardt, 2015; eSkills campaign¹⁹). Therefore, the competence of “programming” has been revisited and redefined so that it is closely aligned to the one used in “Computing and Digital Literacy: Call for a Holistic Approach” (ECDL Foundation, 2015).

Finally, the updating exercise focused on streamlining the competence descriptors by reducing the redundancy of concepts expressed in each descriptor. As well as making the framework leaner, it also helps with the task of building tools for assessing individual’s digital competence.

4.2. Comparison of changes

DigComp 2.0 keeps the same overall structure of 5 competence areas. Table 3 shows the changes in the names of competence in *italics*.

	Competence areas version 1.0	Competence areas version 2.0
Inter-related areas with overlapping points and cross-references	1. Information	1. Information <i>and data literacy</i>
	2. Communication	2. Communication <i>and collaboration</i>
	3. Content creation	3. <i>Digital</i> content creation
Cross-cutting across all areas	4. Safety	4. Safety
	5. Problem solving	5. Problem solving

Table 3: Areas of Digital Competence based on DigComp 1.0

It is worth mentioning that the division of areas and competences is artificial and in reality, there are numerous overlaps and cross-references across areas and competences. Also, the nature of the areas is not always similar (see Table 3, left

¹⁹ <http://eskills-week.ec.europa.eu/>

column). Arguably, the area of "Problem solving" is the most cross-cutting of all and therefore it can be found in all of the other competence areas, as was illustrated in the previous report (JRC-IPTS, 2013, p.11) with the following example:

..the competence area "Information" (area 1) includes the competence "evaluating information", which is part of cognitive dimension in problem solving. Communication and content creation include several elements of problem solving (namely: interacting, collaborating, developing content, integrating and re-laborating, programming...). Despite including problem solving elements in relevant competence areas, it was seen necessary to have a dedicated stand-alone area about problem solving, as for the relevance this aspect has on the appropriation of technologies and digital practices. It can be noted that some of the competences listed in areas 1 to 4 can also be mapped into area 5.

DigComp 2.0 numbers the competence areas in the same way as version 1.0: i.e. from 1 to 5. The progression does not refer to growing achievement or any other type of hierarchy. All competences within the area use a sequential numbering scheme of two numbers (e.g. 1.3): the first sequence indicates the competence area and the second indicates the competence (*area.competence*).

Finally, it is important to highlight that the DigComp framework is descriptive rather than prescriptive. Several aspects of digital competence may include legal and ethical issues, for example, issues related to illegal sharing of proprietary digital content. The person who engages in this illegal activity may be competent and aware of the licences and rules being broken. Therefore, in this framework ethical aspects are included in terms of competences (i.e. knowledge of rather than correct behaviour). In other words, we raise the issue but believe it is up to the implementation initiatives to define this competence in more prescriptive terms, if they so wish. Moreover, the descriptive nature also applies when tailoring interventions (e.g. instructional planning and curriculum development) to fit the specific needs of target groups. Instead of directly transposing the DigComp framework into actual learning activities, or using it to measure student performance as such, it should be used as a reference framework.

In Table 4, the competences from versions 1.0 and 2.0 are displayed side by side in order to facilitate comparison. This allows us to see what kinds of changes took place in Phase 1 of the update. The changes were a result of a detailed mind-mapping exercise that was conducted in order to reflect the scope of each competence (see Annex 1: Illustrations of the updated changes). These changes will be further reflected in Phase 2 of the update through examples of knowledge, skills and competences that relate to each of the competences (Dimension 4).

Table 4: Comparison of competence descriptors in version 1 and 2

Competences version 1.0	Competences version 2.0
<p>1.1 Browsing, searching and filtering information</p> <p>To access and search for online information, to articulate information needs, to find relevant information, to select resources effectively, to navigate between online sources, to create personal information strategies</p>	<p>1.1 Browsing, searching and filtering data, information and digital content</p> <p>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.</p>
<p>1.2 Evaluating Information</p> <p>To gather, process, understand and critically evaluate information</p>	<p>1.2 Evaluating data, information and digital content</p> <p>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.</p>
<p>1.3 Storing and retrieving information</p> <p>To manipulate and store information and content for easier retrieval, to organise information and data</p>	<p>1.3 Managing data, information and digital content</p> <p>To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.</p>
<p>2.1 Interacting through technologies</p> <p>To interact through a variety of digital devices and applications, to understand how digital communication is distributed, displayed and managed, to understand appropriate ways of communicating through digital means, to refer to different communication formats, to adapt communication modes and strategies to the specific audience</p>	<p>2.1 Interacting through digital technologies</p> <p>To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.</p>
<p>2.2 Sharing information and content</p> <p>To share with others the location and content of information found, to be willing and able to share knowledge, content and resources, to act as an intermediary, to be proactive in the spreading of news, content and resources, to know about citation practices and to integrate new information into an existing body of knowledge</p>	<p>2.2 Sharing through digital technologies</p> <p>To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices.</p>
<p>2.3 Engaging in online citizenship</p> <p>To participate in society through online engagement, to seek opportunities for self-development and empowerment in using technologies and digital environments, to be aware of the potential of technologies for citizen participation</p>	<p>2.3 Engaging in citizenship through digital technologies</p> <p>To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.</p>
<p>2.4 Collaborating through digital channels</p> <p>To use technologies and media for team work, collaborative processes and co-construction and co-creation of resources, knowledge and content</p>	<p>2.4 Collaborating through digital technologies</p> <p>To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of resources and knowledge.</p>

<p>2.5 Netiquette</p> <p>To have the knowledge and know-how of behavioural norms in online/virtual interactions, to be aware of cultural diversity aspects, to be able to protect self and others from possible online dangers (e.g. cyber bullying), to develop active strategies to discover inappropriate behaviour</p>	<p>2.5 Netiquette</p> <p>To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.</p>
<p>2.6 Managing digital identity</p> <p>To create, adapt and manage one or multiple digital identities, to be able to protect one's e-reputation, to deal with the data that one produces through several accounts and applications</p>	<p>2.6 Managing digital identity</p> <p>To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.</p>
<p>3.1 Developing content</p> <p>To create content in different formats including multimedia, to edit and improve content that s/he has created or that others have created, to express creatively through digital media and technologies</p>	<p>3.1 Developing digital content</p> <p>To create and edit digital content in different formats, to express oneself through digital means.</p>
<p>3.2 Integrating and re-elaborating</p> <p>To modify, refine and mash-up existing resources to create new, original and relevant content and knowledge</p>	<p>3.2 Integrating and re-elaborating digital content</p> <p>To modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.</p>
<p>3.3 Copyright and Licences</p> <p>To understand how copyright and licences apply to information and content</p>	<p>3.3 Copyright and licences</p> <p>To understand how copyright and licences apply to data, information and digital content.</p>
<p>3.4 Programming</p> <p>To apply settings, programme modification, programme applications, software, devices, to understand the principles of programming, to understand what is behind a programme</p>	<p>3.4 Programming</p> <p>To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.</p>
<p>4.1 Protecting devices</p> <p>To protect own devices and to understand online risks and threats, to know about safety and security measures</p>	<p>4.1 Protecting devices</p> <p>To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy.</p>
<p>4.2 Protecting personal data</p> <p>To understand common terms of service, active protection of personal data, understanding other people privacy, to protect self from online fraud and threats and cyber bullying</p>	<p>4.2 Protecting personal data and privacy</p> <p>To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used.</p>
<p>4.3 Protecting health</p> <p>To avoid health-risks related with the use of technology in terms of threats to physical and psychological well-being</p>	<p>4.3 Protecting health and well-being</p> <p>To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.</p>

<p>4.4 Protecting the environment</p> <p>To be aware of the impact of ICT on the environment</p>	<p>4.4 Protecting the environment</p> <p>To be aware of the environmental impact of digital technologies and their use.</p>
<p>5.1 Solving technical problems</p> <p>To identify possible problems and solve them (from trouble-shooting to solving more complex problems) with the help of digital means</p>	<p>5.1 Solving technical problems</p> <p>To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).</p>
<p>5.2 Identifying needs and technological responses</p> <p>To assess own needs in terms of resources, tools and competence development, to match needs with possible solutions, adapting tools to personal needs, to critically evaluate possible solutions and digital tools</p>	<p>5.2 Identifying needs and technological responses</p> <p>To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility).</p>
<p>5.3 Innovating and creatively using technology</p> <p>To innovate with technology, to actively participate in collaborative digital and multimedia production, to express oneself creatively through digital media and technologies, to create knowledge and solve conceptual problems with the support of digital tools.</p>	<p>5.3 Creatively using digital technologies</p> <p>To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.</p>
<p>5.4 Identifying digital competence gaps</p> <p>To understand where own competence needs to be improved or updated, to support others in the development of their digital competence, to keep up-to-date with new developments</p>	<p>5.4 Identifying digital competence gaps</p> <p>To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.</p>

5. Use and uptake of DigComp

Since its inception, the DigComp framework has been well received and taken up by various stakeholders. This versatile instrument is used for various purposes. In this section, and as illustrated in Figure 2, we categorise three different uses the framework can have in the context of education, training and employment as follows:

- 1) Policy formulation and support
- 2) Instructional planning for education, training and employment
- 3) Assessment and certification

The stakeholders range from policy makers, educational and employment authorities at national and regional levels to public and private training institutions and the third sector bodies, which provide education and training opportunities.

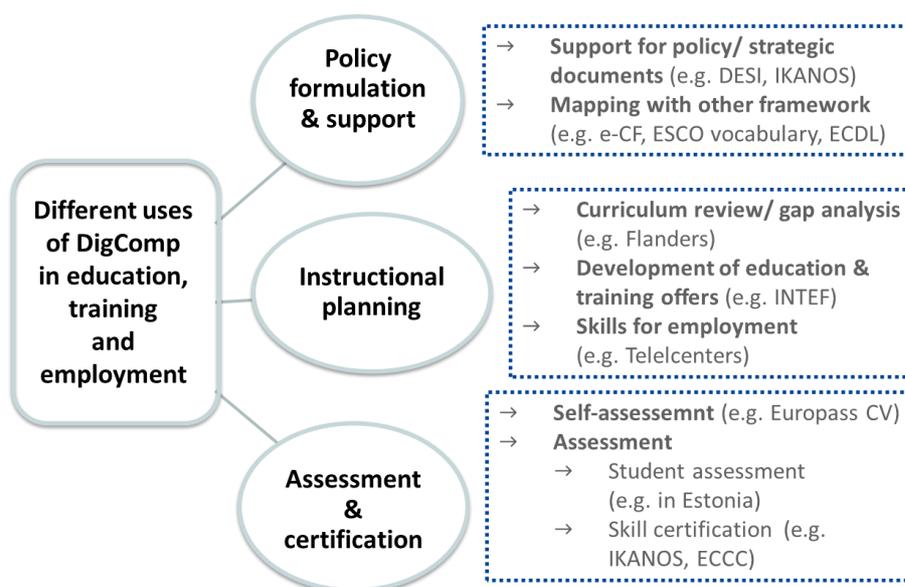


Figure 2: Different uses require different types of implementations

In an attempt to share practices and offer opportunities for peer learning around the implementation of DigComp, in 2015 an “Implementation Gallery” was launched on the JRC Science Hub website²⁰. The Implementation Gallery works on the self-reporting principal and presents snapshots of the implementations at a given moment in time. The goal is to display examples of use across Europe. These should not be regarded, by definition, as best practices. In this section, we will describe a number of these uses by various stakeholders in the three above-mentioned categories (see also the map in Annex 4), without providing an exhaustive overview of DigComp implementations. We will also give some examples of work done at the European level, either through institutions or project work.

5.1. Purpose of use: Policy formulation and support

In this sub-section, we describe how DigComp has been used to support strategic planning and policy-making. Secondly, we list some examples where it has been used to compare existing frameworks by mapping areas in order to better understand the synergies, overlaps and possible gaps.

Strategic support for policy-formulation is one of the purposes of DigComp use at the national and regional level. The Ikanos²¹ project was developed by the Basque

²⁰ <https://ec.europa.eu/jrc/digcomp/implementation>

²¹ http://ikanos.blog.euskadi.net/?page_id=2423&lang=en

Government (Spain) to promote the Information and Knowledge Society in the Basque Region. In 2016, the new Digital Agenda 2020 for the integration of digital competence into education and the workplace was launched. Since 2013, however, the Basque Government has deployed various tools and competence profiles to train, boost and assess digital competence within existing education and training systems, among citizens and job-seekers, and companies and public administrators (Figure 3) - some of which will be explained later in this report.

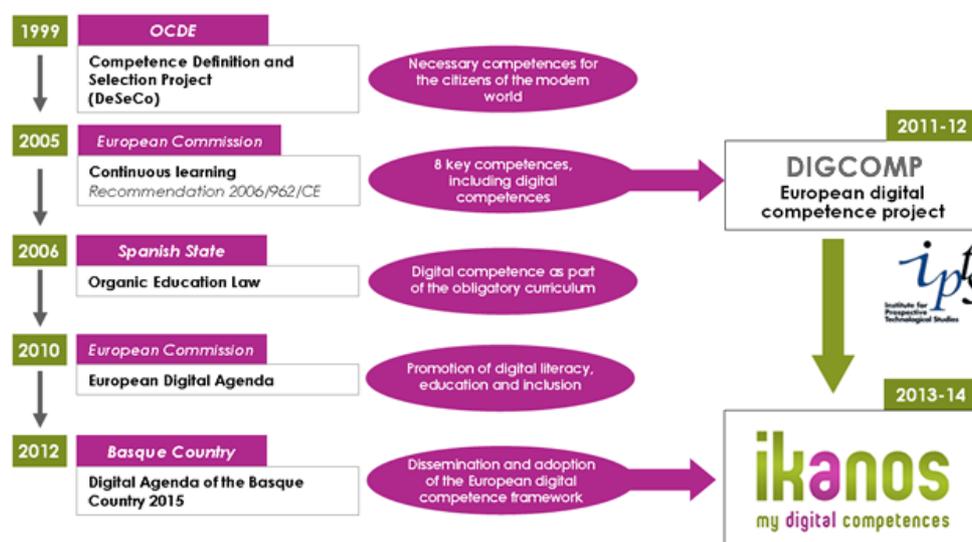


Figure 3: DigComp supporting policy formulation in the Basque Country, Spain.

In order to help policymakers to obtain a macro-level view of citizens' digital competence, the European Commission has developed a Digital Skills Index (DESI). This composite indicator is based on DigComp's four competence areas (information, communication, content creation and problem solving). It uses data from the European Union Survey on Internet Usage in Households and by Individuals (which covers a representative sample of the EU population between the ages of 16 and 74) from Eurostat. It focuses on how individuals have used the internet in the last three months²² as a proxy for digital skills.

On the Digital Scoreboard website has an interactive tool for viewing and further analysing the data. The indicator can be, for example, broken down by various background variables, so it is possible to assess the digital skills of the individuals, but also the EU workforce. Four levels for citizens' digital competence are used (no-low-basic-above basic). Figure 4 provides a bar chart of individuals with "basic" and "above basic" digital skills for each EU country, plus Norway and Iceland. In the EU-28, the average of individuals with "basic" and "above basic" digital skills is 55%, whereas the average in the active labour force (employed and unemployed) is 63%. Applying DigComp for job-related training and up/re-skilling could bring further advantages.

Various policy documents also use or reference DigComp. For example, a recent publication by the Italian Coalition for Digital Skills included a Strategy and Roadmap for Digital Competence in 2016²³, which outlined a translation of DigComp. Also, the Italian National Plan for Digital School (Il Piano Nazionale Scuola Digitale), released in late

²² http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=13706, see p. 32

²³ Competenze Digitali: strategia e roadmap 2016: http://www.agid.gov.it/sites/default/files/documenti_indirizzo/agid_-_competenze_digitali_2016_r11.pdf

2015²⁴, lists DigComp in its guideline document. Similarly, the Maltese Ministry for Education and Employment published the "Green Paper: Digital Literacy"²⁵ in 2015, which references the DigComp framework. The Navarra Department of Education in Spain also uses DigComp as a key reference for its strategic planning.

Another example of using DigComp to support implementations comes from Poland. The Operational Programme Digital Poland 2014-2020 refers²⁶ to DigComp, among a number of key frameworks, as supporting the implementation of e-integration projects (Digital competences of the society).

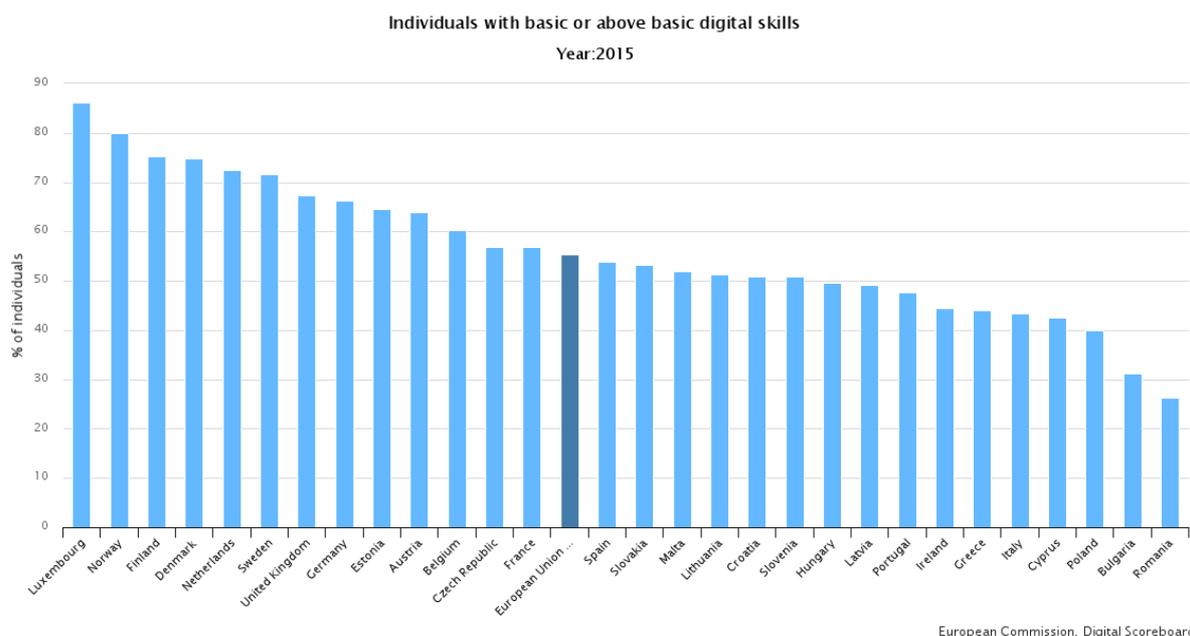


Figure 4: A bar chart showing the Digital Skill index by country in 2015.

An example of gap analysis to compare existing frameworks is the ESCO²⁷ list of transversal ICT skills. Here, DigComp was used as one of the reference tools for ESCO, the multilingual classification of European Skills, Competences, Qualifications and Occupations. ESCO is coordinated by DG Employment, Social Affairs and Inclusion, and supported by the European Centre for the Development of Vocational Training (Cedefop). ESCO is part of the Europe 2020 strategy.

The ESCO classification identifies and categorises skills, competences, qualifications and occupations for the EU labour market and education and training. One of these classifications is the ESCO list of Transversal ICT skills. During its development in 2015, the DigComp framework was used as one of the reference tools for gauging the competence areas and needed skills. Table 5 shows the five areas finally included in the ESCO Transversal ICT skills list, and the corresponding areas in DigComp.

DigComp has itself taken advantage of this collaboration by adding a number of new concepts into its updated framework. This is a good demonstration of convergence

²⁴ http://www.istruzione.it/scuola_digitale/allegati/Materiali/pnsd-layout-30.10-WEB.pdf

²⁵ See: <https://education.gov.mt/elearning/Documents/Green%20Paper%20Digital%20Literacy%20v6.pdf>

²⁶ <https://mc.gov.pl/projekty/polska-cyfrowa-po-pc-2014-2020/ramowy-katalog-kompetencji-cyfrowych>

²⁷ <https://ec.europa.eu/esco/>

towards the same vision for enhanced compatibility and interoperability between instruments, at the same time keeping the specificities of each instrument.

Table 5: The mapping of the competence areas of DigComp and an ESCO example

DigComp	ESCO transversal ICT skills
Information and data literacy	Digital data-processing
Communication and collaboration	Digital communication
Digital content creation	Content-creation with ICT software
Safety	ICT Safety
Problem solving	Problem-solving with ICT tools and hardware

Similarly, the **e-Competence Framework for ICT Professionals (e-CF)** was mapped with DigComp to better understand the synergies between existing frameworks. In this case, the main difference between the instruments is that one is for a general audience, i.e. DigComp for citizens, whereas the e-CF framework is for professionals working in the ICT sector. The advantage of mapping the two is to show the continuity of certain skills when passing from competences expected of citizens to those expected of ICT professionals (see Annex 5 for the entire list of cross-references).

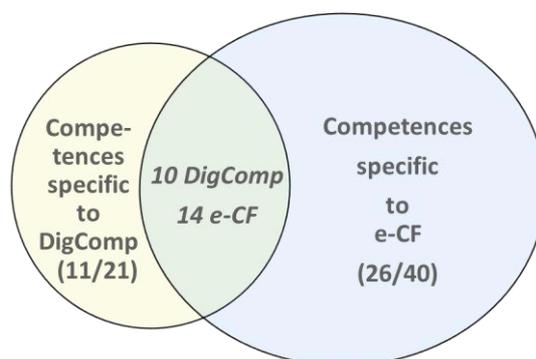


Figure 5: Area of cross-reference between DigComp and e-CF

The mapping revealed that 10 out of 21 DigComp competence descriptors have a relationship, either full or partial, to 14 competences that are described in the e-CF (see Figure 5). In other words, out of the list of 40 e-CF competences, a third (14) can be cross-referenced with DigComp. This demonstrates, among other things, that the ICT competence required of professionals in the ICT sector has a much wider scope (i.e. 40 vs. 21 competence descriptors) and is more specifically focused on ICT tasks related with the industry.

Another example of gap analysis to compare existing frameworks is the Basic Digital Skills framework²⁸. It has been developed by GO ON UK that works in close cooperation with the Cabinet Office and the UK Government’s Digital Service. In their recent update of the framework, the area of “problem solving” was added into the Basic Digital Skills framework. This new area now aims to “Increase independence and

²⁸ <https://www.go-on.co.uk/get-involved/basic-digital-skills/>. (note: at the time of publication of this report, the news item about the update has been removed)

confidence by solving problems using digital tools and finding solutions". This addition was inspired by the DigComp framework.

5.2. Purpose of use: Instructional planning

DigComp has mostly been taken up to develop education and training initiatives for education, skills and employment purposes. In the following, we outline cases where DigComp is used in various contexts.

New training syllabus for digital competence in adult education is an inspiring example of how DigComp was used to support a curriculum review and update. In 2014, the Department of Education in Flanders, Belgium, set up a cross-sectoral curriculum commission to review the content of existing ICT programmes in the adult education sector. In Flanders, this sector enrolls some 400,000 adults a year. In total, eight educational programmes were developed with different sets of modules. Each module includes a set of competences derived from DigComp. From September 2016 onwards, adult centres will be able to use the new programmes.

Professional development programmes for teachers in various EU countries have embraced the DigComp Framework for teachers' digital competence building. For example, the Ministry of Education, Culture and Sports in Spain created A Common Framework for Digital Competence for Teachers (*Marco comun de Competencia Digital Docente 2.0*)²⁹ in 2014. Since then, INTEF develops new digital training materials for teachers based on DigComp. These include, for example, a Massive Open Online Course (MOOC) on how to teach and evaluate digital competence³⁰, already in its 3rd edition. In 2016, a number of short, 3 hours per unit, online courses on DigComp were also launched³¹. Moreover, the use of DigComp for Professional Development (PD) for teachers has been agreed between the state and regional governments. This has encouraged implementation, e.g. Extremadura has introduced a digital competence portfolio for teachers based on the Spanish model of Teacher DigComp³².

The Education Development Centre in Lithuania, which is under the direct authority of the Ministry of Education and Science, conducts similar work to implement the DigComp framework for professional development for teachers since 2015³³.

In Portugal, the Directorate-General for Education of the Ministry of Education uses DigComp as an input for professional development courses for teachers since 2016. The translation of DigComp³⁴ has been done by the Research Centre "Didactics and Technology in Education of Trainers" (CIDTFF) with the support of the Directorate-General for Education of the Portuguese Ministry of Education.

The Norwegian Centre for ICT has been using the DigComp since 2013 as a general reference for the development of their national digital competence framework for the teaching profession. Here, it is used to guide initial and continuing teacher training.

In Croatia, the *e-Schools project* (2015-2022)³⁵ is implementing DigComp as a key support for digitally-competent teachers in Digitally-Mature Schools. The e-Schools project is led by the Croatian Academic and Research Network and co-funded by the European Regional Development Fund and the European Social Fund.

²⁹ <http://blog.educalab.es/intef/2015/10/22/common-framework-for-digital-competence-of-teachers/>

³⁰ http://mooc.educalab.es/courses/INTEF/INTEF162/2016_ED3/about?preview-lang=en

³¹ http://mooc.educalab.es/courses/INTEF/NOOC02/2016_ED1/about

³² <http://www.educarex.es/edutecnologias/porfoliotic.html>

³³ http://www.upc.smm.lt/projektai/mentep/DIGCOMP_saltiniai.php

³⁴ See:

http://erte.dge.mec.pt/sites/default/files/Recursos/Estudos/digcomp_proposta_quadro_ref_eur_opeu_compet_digital.pdf

³⁵ http://www.carnet.hr/e-schools/project_description

Third-sector education and training programmes have also embraced the DigComp framework. For example, the members of Telecentre Europe (TE) have implemented DigComp in various instances. Telecentre Europe is a European not-for-profit organisation that represents publicly-funded telecentres/telecentre networks, ICT learning centres, adult education centres and libraries across Europe. In these places, children and adults can access the internet, learn the latest digital skills and keep up to date with technology and community developments.

In December 2015, Telecentre Europe published "Guidelines on the adoption of DigComp"³⁶ (Figure 6) including case studies as examples of good practice. The examples in the Guidelines include an extended overview of the above-mentioned Ikanos-project in the Basque Country (Spain) that offers training and self-assessment through the Telecenters' network. Another example from Spain is offered by Guadalinfo (an initiative run by local and regional authorities in the Andalusia region) through the portal called "Andalusia digital"³⁷. It includes an implementation of self-assessment and training actions for job-seekers based on DigComp. Additionally, the Guidelines present an Italian example from Emilia Romagna region, called the "Pane e Internet" (Bread and internet)³⁸ project, and explains the use of DigComp in redesigning courses and accompanying materials for an e-inclusion initiative.

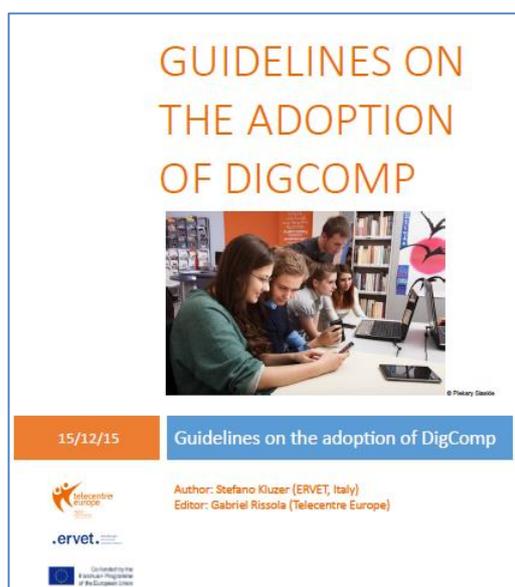


Figure 6: The cover page of the Guidelines that also offers "Lessons learned and recommendations"

Another type of example of DigComp use for instructional planning of training offers is provided by ECDL Foundation. ECDL Foundation is an international organisation dedicated to raising digital competence standards in the workforce, education and society. The ECDL training modules, delivered in more than 40 languages worldwide, are focused on tools and applications which cover competences outlined in DigComp.

5.3. Purpose of use: Assessment tool

Tools for assessing one's own digital competence constitute one of the most visible areas of all DigComp implementations. Various stakeholders have operationalised DigComp as a publicly and freely used tool. One of the first implementations, available

³⁶ http://www.telecentre-europe.org/wp-content/uploads/2016/02/TE-Guidelines-on-the-adoption-of-DIGCOMP_Dec2015.pdf

³⁷ <http://www.digcomp.andaluciaesdigital.es/>

³⁸ <http://www.paneeinternet.it/index.php>

since 2012, is an online test called *Skillage*. It was developed by Telecentre Europe to assess young people’s understanding of ICT in an employment setting. The test results in a “Skillage Report” that can be used to help improve skills within the local Telecentre network. In 2014, new evaluation questions were added to the tool, which now covers the five areas of the DigComp conceptual reference model.

The Ikanos project, led by the Basque Government in Spain, was another early implementation (2014) of the DigComp self-assessment grid. It offers a free-of-charge diagnostic tool for assessing one’s own digital competence³⁹. After a 15-minute online test, an evaluation is made available in a simple format. The online tool is based on the five areas of DigComp. The results can be printed out and saved, so that one can, for example, compare results from one year to the next. Training opportunities are also identified (e.g. through Telecenters). The diagnostic tool can also be used by educational institutions in the Basque country, for example, to give them an overview of digital competence at the organisational level.

In summer 2015, the Europass CV⁴⁰ included an online tool for jobseekers to evaluate their own digital competence and include the results in their Curriculum Vitae. The tool uses the five areas of the DigComp framework with an easy-to-use self-evaluation form. This tool is available in all the official EU languages.

	DigComp areas	DigComp competences	Levels	Proficiency levels compatibility
IKANOS	x	x	3 levels: (Basico/Basic; Medio/Average; Avanzado/Advanced)	Levels with loose link to DigComp
Guadalinfo	x	x	4 levels: (Sin competencia; Iniciación; Intermedio avanzado)	Levels with loose link to DigComp
Europass CV	x		3 levels (Basic user, independent user, Proficient user)	Levels as in DigComp
Digital Skills index (DESI)	x		4 levels (No skills; Low skills; Basic skills; Above basic skills)	Levels with no link to DigComp

Table 6: Examples of DigComp as evaluation tool and how the proficiency levels are used.

The last example is the online assessment tool for digital competence published by Guadalinfo⁴¹ in late 2015. Guadalinfo is a network of local and regional authorities of the Region of Andalucía (Spain) with more than 760 centres that offer free access to ICTs for Andalusians. The DigComp based self-assessment tool also links the assessment results with training options in the areas of the digital competence where gaps are identified.

Providing testing and certification based on the DigComp framework is one of the latest uses of the DigComp model. The ECCC Foundation in Poland promotes and

³⁹ <http://ikanos.encuesta.euskadi.net/index.php/566697/lang-en>

⁴⁰ <https://europass.cedefop.europa.eu/editors/en/cv/compose>

⁴¹ <http://www.digcomp.andaluciaesdigital.es/>

disseminates the development of digital and IT competences, an example of which is the translation and promotion of the DigComp report from 2013⁴². ECCC also provides validation of IT and digital competences of citizens (e.g. pupils, students, employed, unemployed, job seekers). The ECCC digital competence validation standard, which is used for the certification process, is based on the DigComp model. Another example is ACTIC⁴³ – the accreditation system for ICT competences in the Catalan Region (Spain) since 2005 – that has recently commissioned work in order to ensure that its digital competence certification system complies better with the DigComp model.

DigComp will also be used for assessing students in Estonia from 2017 onwards. The digital competence of 9th grade students will, for the first time, be assessed with the help of the DigComp framework. This is a follow up from 2014, when the term 'digital competence' was added to the national curriculum. An expert group, charged with creating the assessment instrument, is basing its work on the DigComp framework and the national curriculum. The work is managed by the Information Technology Foundation for Education (HITSA).

5.4. Related work and projects

Using the DigComp conceptual reference model as the basis for a new digital competence framework in a specific context is considered as derivative work. Examples fall into two categories; the new frameworks created by the European Commission and those created by others. For example, JRC-IPTS is currently working on two new Digital Competence Frameworks. The Digital Competence Framework for Consumers (DigCompConsumers⁴⁴) is being produced in collaboration with DG Justice and Consumers and it will be finalised in the course of 2016. Another initiative, which is being carried out in collaboration with DG Education and Culture, is to produce the Digital Competence Framework for the teaching profession (DigCompTeach⁴⁵).



Figure 7: Happy Onlife is a game for children to raise awareness of internet risks and opportunities

The DigComp model has also inspired the development of a game called 'Happy Onlife'⁴⁶ that is available in paper and digital versions (Figure 7). The DigComp area of safety was used in the conceptualisation of the game and the adjunct booklet.

As regards work developed outside the European Commission, the Carer+ project⁴⁷ is an interesting example. This project supports the professional development of care workers who face new challenges in the digital age. A competence framework for care workers was developed using DigComp as one of the basic components.

⁴² <http://www.digcomp.pl/>

⁴³ <http://acticweb.gencat.cat/es/index.html>

⁴⁴ <https://ec.europa.eu/jrc/digcompconsumers>

⁴⁵ <https://ec.europa.eu/jrc/digcompteach>

⁴⁶ <https://ec.europa.eu/jrc/en/scientific-tool/happy-onlife-game-raise-awareness-internet-risks-and-opportunities>

⁴⁷ <http://www.carerplus.eu/developing-training/wiki/digital-competence-framework>

Additionally, related work is being carried out in EU-funded projects. For example 'Digital Competences for Teachers'⁴⁸ uses the DigComp model to develop a set of open educational resources (OER) for training teachers in the field of digital competence. It also assesses their knowledge at the end of the training offered.

5.5. Language translations

Cedefop has translated a concise version of the DigComp self-assessment questionnaire into 24 official EU languages, plus in Icelandic, Norwegian, Macedonian and Turkish, so that people can compose personalised Europass CVs online. The links to the translations on the Cedefop's Europass website are presented in Table 7.

Table 7: Official translations of the DigComp self-assessment questionnaire used for the Europass CV

bg - es - cs - da - de - et - el - en - fr - hr - is - it - lv - lt - hu - mk - mt - nl - no - pl - pt - ro - sk - sl - fi - sv - tr

In addition to the above initiative, a number of Member States have translated the framework into their own languages (e.g. Croatia, Flanders, Belgium, Estonia, Italia, Lithuania, Poland, Portugal, Spain and Slovenia). Hungary and France are also considering translating the framework.

⁴⁸ <http://www.digital-competences-for-teachers.eu/>

6. Conclusion and next steps

Version 1.0 of the DigComp framework was first released in 2013. Since then, there have been numerous implementations at European, national and regional levels, some of which are mentioned in this report. However, as the digitalisation of various aspects of our work, education and society continued to evolve, there was a need to update the concepts and vocabulary of the DigComp framework. A two-phase approach was chosen to achieve this.

The first step - an update of the conceptual reference model - is described in this report. It presents the DigComp conceptual reference model with its 21 updated competence descriptors. The report details all the changes made and further familiarises the reader with the new vocabulary. Finally, a number of examples of implementations at national and European levels are given to illustrate the variety of use.

The second step - the introduction of more fine-grained proficiency levels with examples of knowledge, skills and attitudes for each of the 21 competences - will be validated towards the end of 2016.

Between 2016-2018, the JRC will continue to monitor the implementation of the DigComp framework at regional and national levels (see Implementation Gallery⁴⁹) and ensure it remains up-to-date and policy relevant in the future.

Additionally, the JRC will carry on working on competence frameworks in the areas of education and training, employment and lifelong learning. Examples of these include *the Entrepreneurship Competence Framework for Citizens* (EntreComp⁵⁰, see also Bacigalupo et al., 2016), the *European Framework for Digitally-Competent Educational Organisations* (DigCompOrg⁵¹), the *Digital Competence Framework for Teachers* and the *Digital Competence Framework for Consumers*⁵².

These competence frameworks, and especially DigComp 2.0, aim to support digital skills initiatives with a view to ultimately increasing digital skills capacity in the population, thus enabling more people to participate more deeply in our digital society and economy.

⁴⁹ <https://ec.europa.eu/jrc/en/digcomp/implementation>

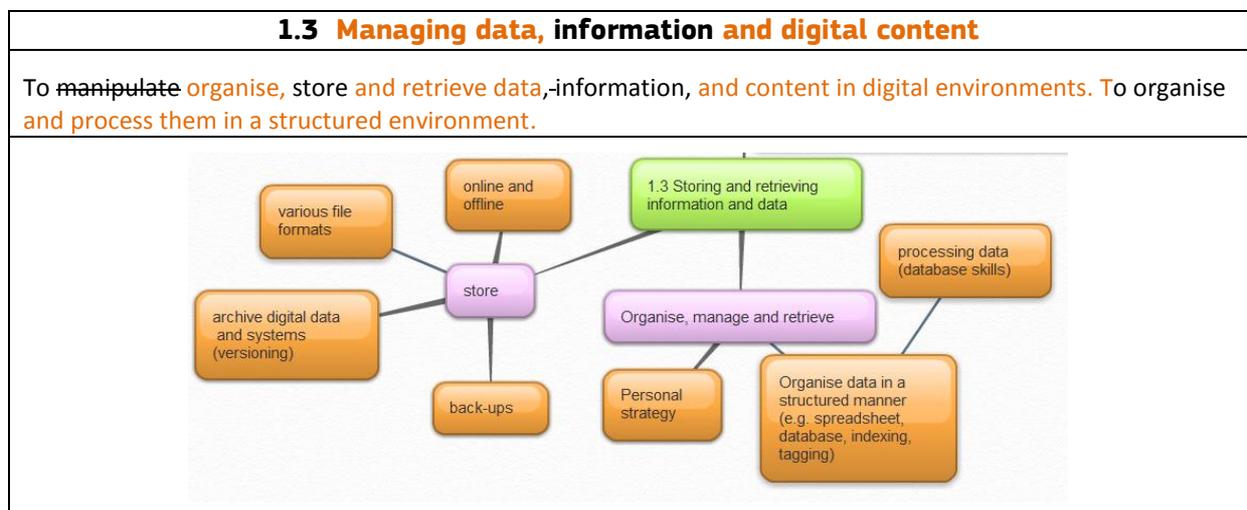
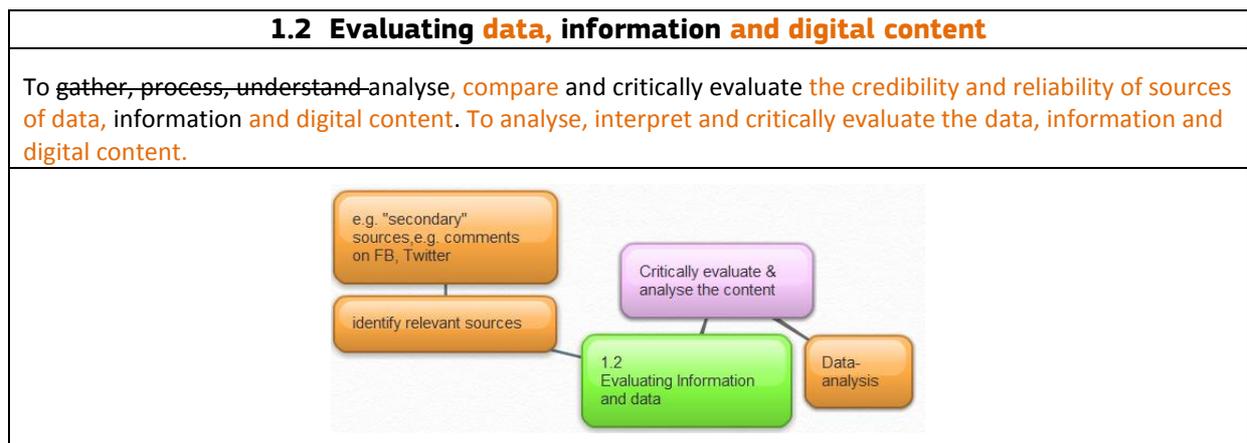
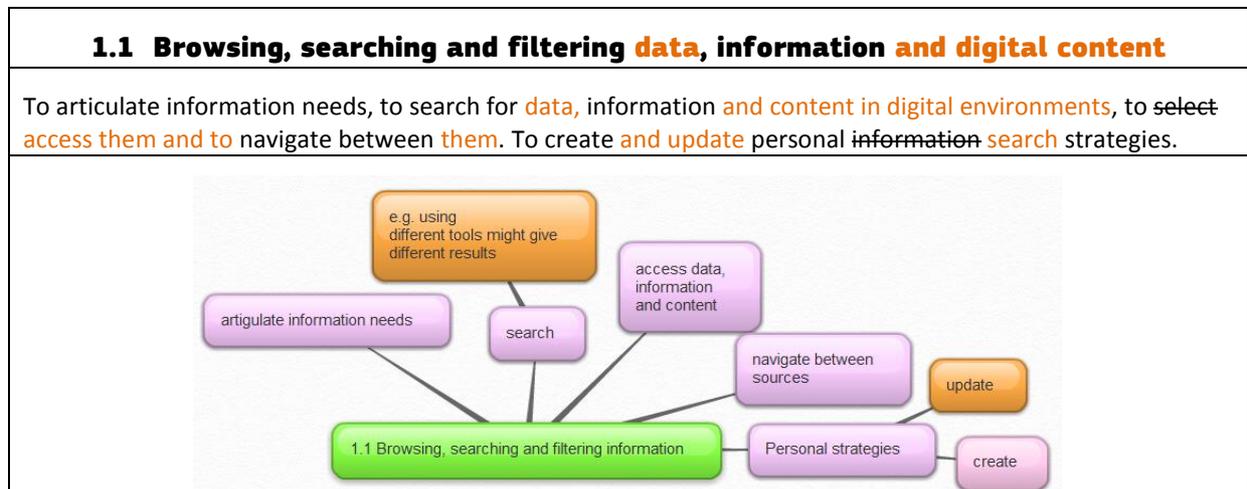
⁵⁰ <https://ec.europa.eu/jrc/en/entrecomp/>

⁵¹ <https://ec.europa.eu/jrc/en/digcomporg>

⁵² <https://ec.europa.eu/jrc/en/digcompconsumersconsumers>

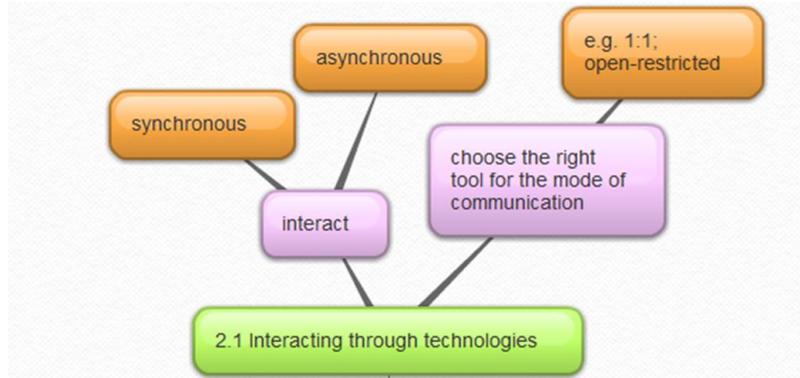
Annex 1: Illustrations of the updated changes

The purpose of the illustrations for each of the competences is to show the conceptual updates to be included in Dimension 4: Examples of knowledge skills and attitudes. This will take place in Phase 2 of the update. The lilac boxes of the mind-map below illustrate the concepts as they were in version 1.0, whereas the orange ones introduce a number of new concepts for consideration.



2.1 Interacting through digital technologies

To interact through a variety of digital technologies devices and applications, to understand how digital communication is distributed, displayed and managed, to understand appropriate digital communication means for a given context.



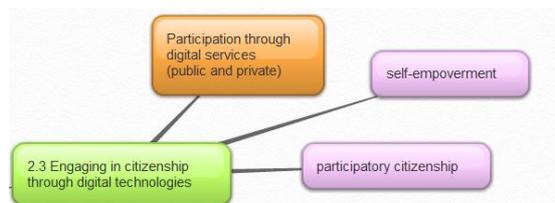
2.2 Sharing information and content through digital technologies

To share data, information and digital content with others through appropriate digital technologies. the location and content of information found, to be willing and able to share knowledge, content and resources, To act as an intermediary, to be proactive in the spreading of news, content and resources, to know about citation referencing and attribution practices and to integrate new information into an existing body of knowledge.



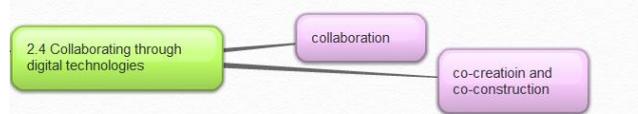
2.3 Engaging in online citizenship through digital technologies

To participate in society through the use of public and private digital services. To seek opportunities using technologies and digital environments to be for self-empowerment and for participatory citizenship through participation engagement, self-development and in using o be aware of the potential appropriate digital technologies.



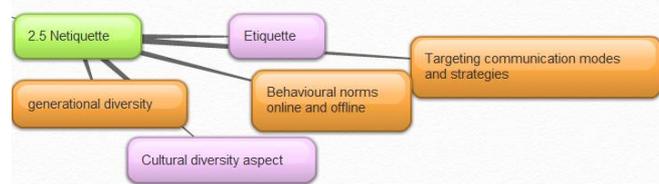
2.4 Collaborating through digital channels technologies

To use digital tools and technologies and media for team work, collaborative processes, and for co-construction and co-creation of resources, knowledge and content.



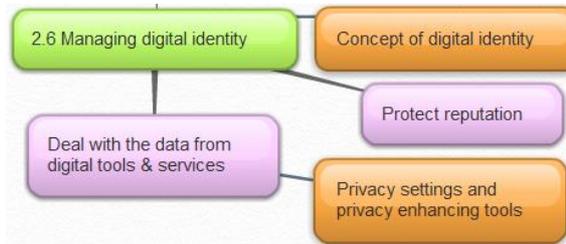
2.5 Netiquette

To have the knowledge and know how be aware of behavioural norms and know-how in online/virtual while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity aspects in digital environments, to be able to protect self and others from possible online dangers in digital environments (e.g. cyber bullying).



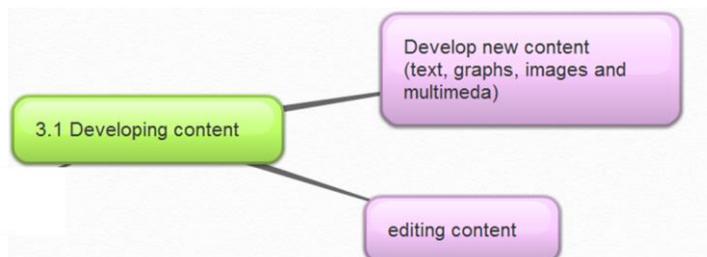
2.6 Managing digital identity

To create, adapt and manage one or multiple digital identities, to be able to protect one's own e-reputation, to deal with the data that one produces through several accounts and applications digital tools, environments and services.



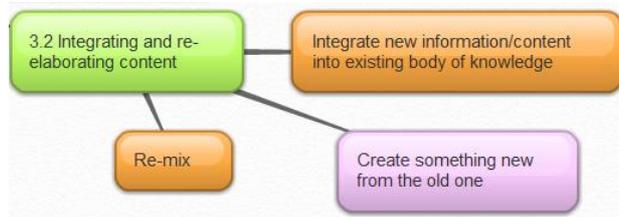
3.1 Developing digital content

To create and edit digital content in different formats including multimedia, to edit and improve content that s/he has created or that others have created, to express creatively oneself through digital means media and technologies.



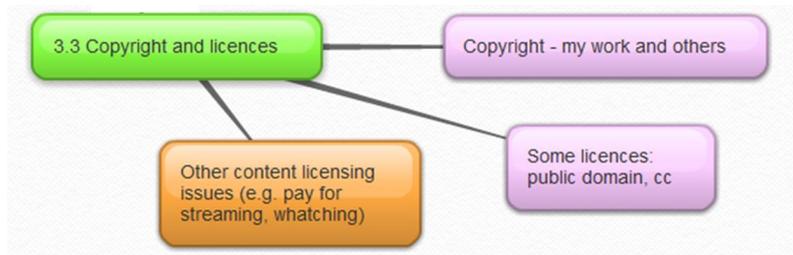
3.2 Integrating and re-elaborating digital content

To modify, refine, improve and integrate information and content into an existing body of knowledge and mash-up existing resources to create new, original and relevant content and knowledge.



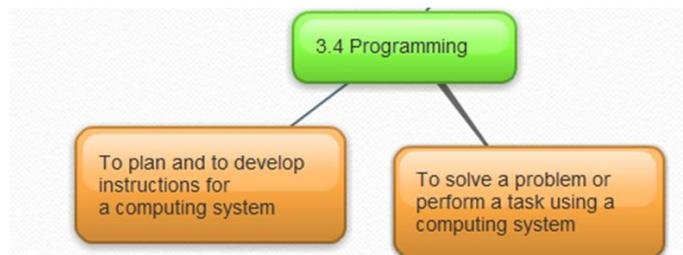
3.3 Copyright and licences

To understand how copyright and licences apply to data, information and digital content.



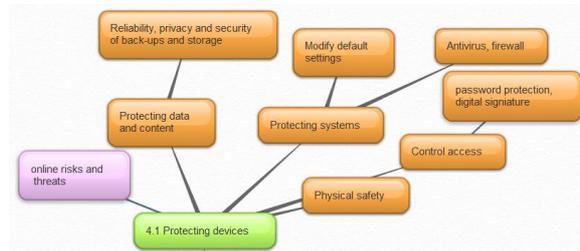
3.4 Programming

To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or to perform a specific task. To apply settings, programme modification, programme applications, software, devices, to understand the principles of programming, to understand what is behind a programme.



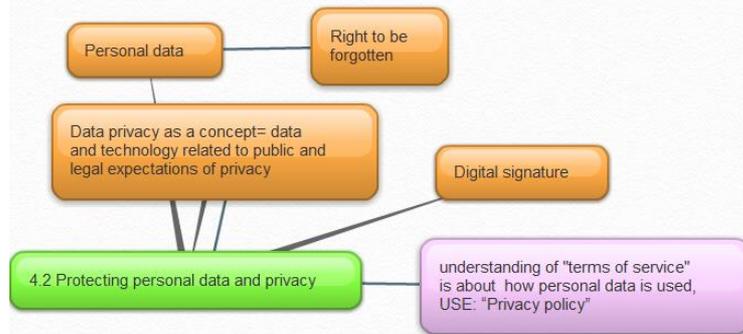
4.1 Protecting devices

To protect ~~own~~ devices and digital content, and to understand ~~online~~ risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy.



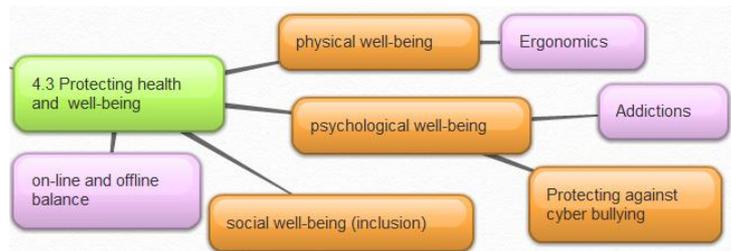
4.2 Protecting personal data and privacy

To understand ~~active protection of personal data and other people's privacy~~ in digital environments. To understand how to use and share personally identifiable information while being able ~~and to protect oneself and others from damages fraud) and threats and cyber bullying~~. To understand that digital services use a "Privacy policy" to inform how personal data is used.



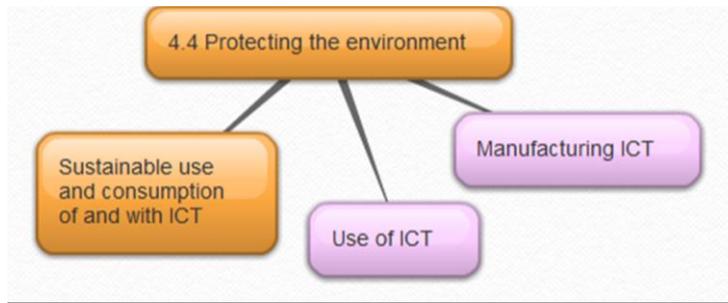
4.3 Protecting health and well-being

To be able to avoid health-risks and threats related with the use of technology in terms of threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.



4.4 Protecting the environment

To be aware of the **environmental** impact of **ICT digital technologies and their use** on the environment.



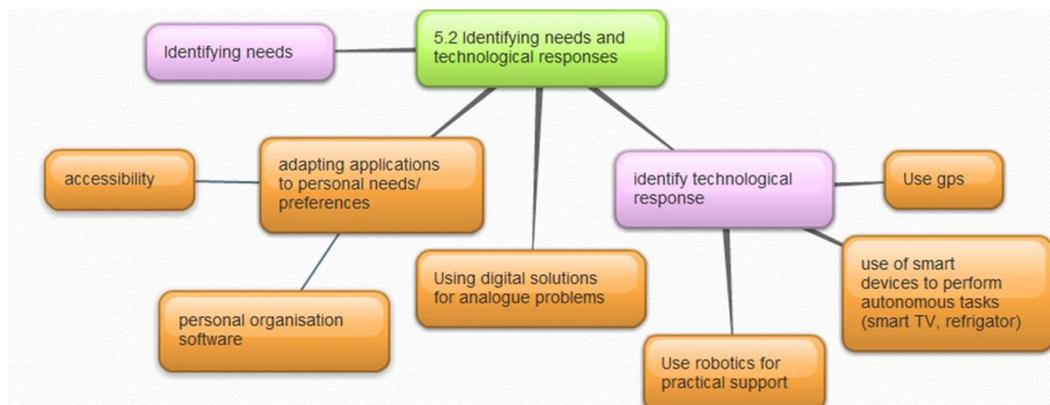
5.1 Solving technical problems

To identify **possible technical** problems **when operating digital devices and using digital environments**, and to solve them (from trouble-shooting to solving more complex problems) **with the help of digital means**.



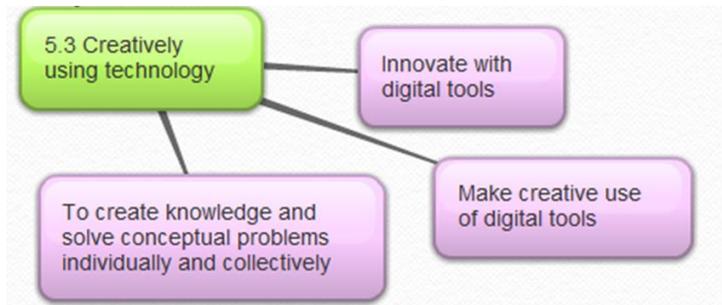
5.2 Identifying needs and technological responses

To assess **own or others'** needs and to **identify, evaluate, select and use digital tools and possible technological responses to solve them**. To **adjust and customise digital environments** to personal needs (e.g. accessibility).



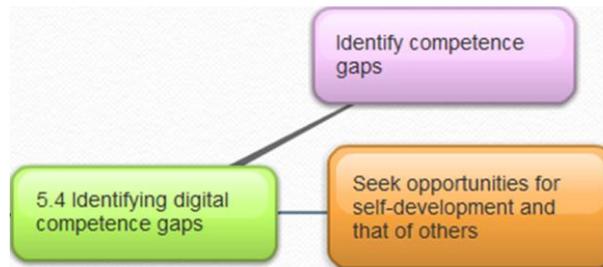
5.3 Innovating and Creatively using digital technologies

To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments. to actively participate in collaborative digital and multimedia production, to express oneself creatively through digital tools, media and technologies, with the support of digital tools



5.4 Identifying digital competence gaps

To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution new developments. To support others in the development of their digital competence.



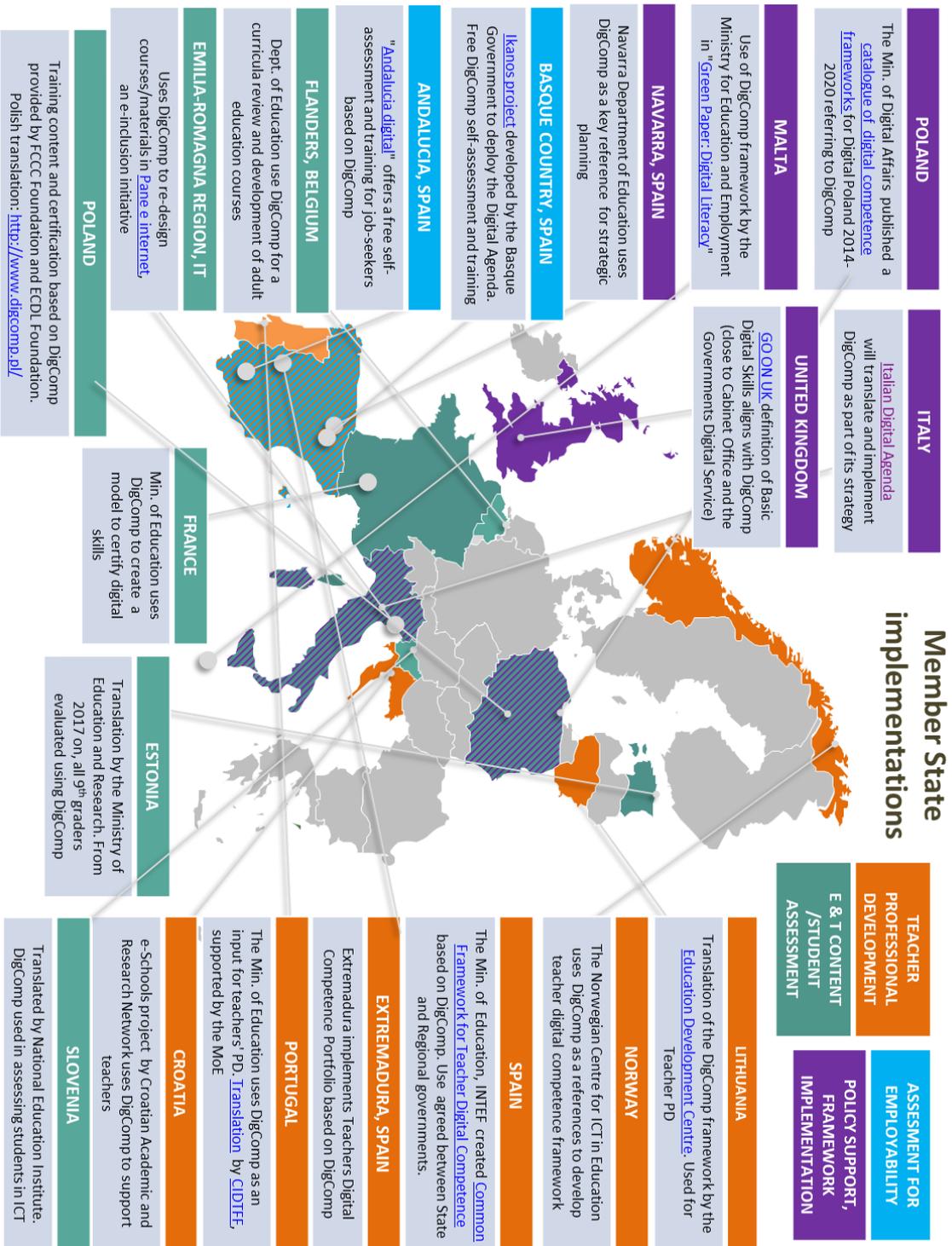
Annex 2: Mapping of UNESCO's MIL to DigComp

Competences in DigComp	Media and Information Literacy Curriculum for Teachers (2011)
<p>1.1 Browsing, searching and filtering data, information and digital content</p> <p>1.2 Evaluating data, information and digital content</p> <p>1.3 Managing data, information and digital content</p>	<p>IL: Define and articulate information needs</p> <p>IL: Locate and access information</p> <p>IL: Assess Information</p> <p>IL: Organize Information</p> <p>IL: Use ICT skills for information processing</p> <p>ML: Critically evaluate media content (...in the light of media functions)</p>
<p>2.1 Interacting through digital technologies</p> <p>2.2 Sharing through digital technologies</p> <p>2.3 Engaging in citizenship through digital technologies</p> <p>2.4 Collaborating through digital technologies</p> <p>2.5 Netiquette</p> <p>2.6 Managing digital identity</p>	<p>IL: Communicate Information</p> <p>IL: Make ethical use of information</p> <p>ML: Engage with media for self-expression and democratic participation</p>
<p>3.1 Developing digital content</p> <p>3.2 Integrating and re-elaborating digital content</p> <p>3.3 Copyright and licences</p> <p>3.4 Programming</p>	<p>ML: Review skills (including ICTs) needed to produce user-generated content</p>
<p>4.1 Protecting devices</p> <p>4.2 Protecting personal data and privacy</p> <p>4.3 Protecting health and well-being</p> <p>4.4 Protecting the environment</p>	
<p>5.1 Solving technical problems</p> <p>5.2 Identifying needs and technological responses</p> <p>5.3 Creatively using digital technologies</p> <p>5.4 Identifying digital competence gaps</p>	
<p>Note: 2 ML competences without direct mapping to DigComp (ML: Understand the role and functions of media in democratic societies; ML: Understand the conditions under which media can fulfil their functions)</p>	

Annex 3: Mapping “Global Media and Information Literacy Assessment Framework” to DigComp

Competences	Global Media and Information Literacy Assessment Framework (UNESCO, 2013) “MIL Subject Matters”
<p>1.1 Browsing, searching and filtering data, information and digital content</p> <p>1.2 Evaluating data, information and digital content</p> <p>1.3 Managing data, information and digital content</p>	<p>1.1. Definition and articulation of a need for information</p> <p>1.2 Search and location of information and media content</p> <p>1.3 Access to information, media content and media and information providers</p> <p>1.4 Retrieval and holding/storage of information and media content</p> <p>2.2 Assessment of information and media content, and media and information providers</p> <p>2.3 Evaluation of information and media content, and media and information providers</p> <p>2.4 Organisation of information and media content</p>
<p>2.1 Interacting through digital technologies</p> <p>2.2 Sharing through digital technologies</p> <p>2.3 Engaging in citizenship through digital technologies</p> <p>2.4 Collaborating through digital technologies</p> <p>2.5 Netiquette</p> <p>2.6 Managing digital identity</p>	<p>3.2 Communication of information, media content and knowledge ... (see below)</p> <p>3.3 Participating in societal-public activities as active citizen</p> <p>3.4 Monitoring influence of information, media content, knowledge production and use, as well as of media and information providers</p>
<p>3.1 Developing digital content</p> <p>3.2 Integrating and re-elaborating digital content</p> <p>3.3 Copyright and licences</p> <p>3.4 Programming</p>	<p>3.1 Creation of knowledge and creative expression</p> <p>3.2 in an ethical and effective manner</p>
<p>4.1 Protecting devices</p> <p>4.2 Protecting personal data and privacy</p> <p>4.3 Protecting health and well-being</p> <p>4.4 Protecting the environment</p>	
<p>5.1 Solving technical problems</p> <p>5.2 Identifying needs and technological responses</p> <p>5.3 Creatively using digital technologies</p> <p>5.4 Identifying digital competence gaps</p>	

Annex 4: A snapshot of Member State implementations



Annex 5: Cross-references between DigComp and e-CF

DigComp competence	Nature of cross-reference	e-CF competence
3.4 Programming	could correspond with	A.6. Application Design (EQF levels 3-6); B.1 Application Development (EQF levels 3-8); B.6 Systems Engineering (EQF levels 6-7)
1.3 Storing and retrieving information	higher levels could correspond with	D.10 Information and Knowledge Management (EQF levels 6-8)
4.1 Protecting devices	higher levels could correspond with	D.1 Information Security Strategy Management (EQF levels 7-8); E.8. Information Security Management (EQF levels 5-7)
4.4 Protecting the environment	higher levels could correspond with	A.8 Sustainable Development (EQF levels 6-7)
5.1 Solving technical problems	higher levels could correspond with	C.4. Problem Management (EQF levels 4-7)
5.3 Innovating and creatively using technology	higher levels could correspond with	A.9 Innovating (EQF levels 7-8)
5.2 Identifying needs and technological responses	higher levels could partially correspond with	A.4. Product/Service Planning (EQF levels 4-7)
5.4 Identifying digital competence gaps	higher levels could partially correspond with	D.3. Education and Training Provision (EQF levels 4-6); D.9. Personnel Development (EQF levels 4-7)
2.6 Managing Digital Identity	higher levels could partially correspond with	E.3. Risk Management (EQF levels 4-7)
3.3 Copyright and Licences	higher levels could partially correspond with	D.8. Contract Management EQF levels 4-7) Note: many others also mention IPR as a knowledge example

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List of abbreviations and definitions

A number of basic terms are used in this report that are based on definitions as such the ones found in the European Qualifications Framework (European Parliament and the Council, 2008).

Competence

In the Key Competences Recommendation, *competence* is defined as a combination of knowledge, skills and attitudes appropriate to the context (European Parliament and the Council, 2006). In the context of this work, competence is understood as a set of knowledge, attitudes and skills.

Knowledge

Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual.

Skills

Skill means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).

Attitudes

Attitudes are conceived as the motivators of performance, the basis for continued competent performance. They include values, aspirations and priorities.

Dimensions

The concept of "dimension" in this work is used in the same way that it is used in *the eCompetence framework for ICT professionals*. In both works, the word 'dimension' refers to the structure of the framework, i.e. the way in which the content of the framework is displayed.

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*Serving society
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