

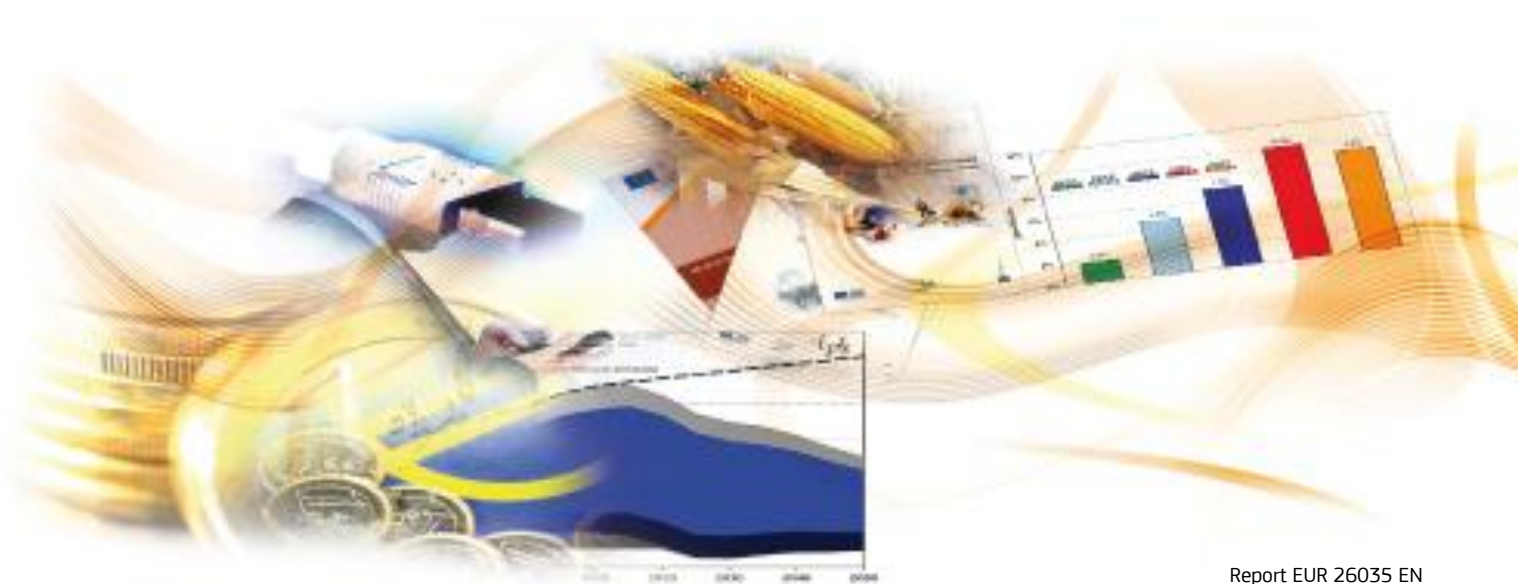
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DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe.

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Preface

With the 2006 European Recommendation on Key Competences,¹ Digital Competence has been acknowledged as one of the 8 key competences for Lifelong Learning by the European Union. Digital Competence can be broadly defined as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society. Digital competence is a transversal key competence which, as such, enables us to acquire other key competences (e.g. language, mathematics, learning to learn, cultural awareness). It is related to many of the 21st Century skills which should be acquired by all citizens, to ensure their active participation in society and the economy.

This report is part of a project on Digital Competence, launched by the Information Society Unit at JRC-IPTS² on behalf of DG Education and Culture. Its overall aim is to contribute to the better understanding and development of Digital Competence in Europe. The project, which was carried out between January 2011 and December 2012,³ had the following objectives:

- *To identify* the key components of Digital Competence in terms of the knowledge, skills and attitudes needed to be digitally competent;
- *To develop* Digital Competence descriptors that will feed a conceptual framework and/or guidelines that can be validated at European level, taking into account relevant frameworks currently available;
- *To propose* a roadmap for the possible use and revision of a Digital Competence framework and descriptors of Digital Competences for all levels of learners.

The project aims to achieve these objectives in collaboration and interaction with stakeholders at European level.

This report contributes to the third and final work package of the project, by proposing a framework for the development of Digital Competence.

Previous reports on the data collection phases can be consulted at the following webpages:

- Report on the conceptual mapping of digital competence in the academic and policy literature: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=4699>
- Report on the analysis of case studies for the development of digital competence: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5099>
- Report on the opinions of experts collected during an online consultation: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5339>

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¹ [Official Journal L 394 of 30.12.2006](#)

² The Institute for Prospective Technological Studies (IPTS) is one of the seven research institutes that make up the European Commission's Joint Research Centre.

³ For more information, see: <http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html>

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Executive Summary

This report presents the final findings of the DIGCOMP projects and proposes a framework for digital competence for all citizens. Digital competence is one of the eight key competences for lifelong learning and is essential for participation in our increasingly digitalised society. However, international surveys and academic literature warn that many people lack digital capabilities. In order to be able to fill the digital competence gap, it is necessary to understand and define what digital competence is. This report details the various aspects of digital competence by listing 21 competences and describing them in terms of knowledge, skills, and attitudes.

The output of this project was based on a data collection phase (including a literature review, case study analysis, and an online survey) and an intensive stakeholder consultation (including workshops, interviews, reviews by experts, presentations at seminars and conferences). It consists of:

- A self-assessment grid comprising five areas of digital competence across three proficiency levels;
- A detailed framework with an in-depth description of the different aspects of digital competence.

Each of the 21 competences identified is presented in a table and includes: a short definition of the competence, descriptors for three proficiency levels, examples of the knowledge, skills, and attitudes related to the competence, and two examples of how the competence could be applied to specific purposes, i.e. learning and employment.

The areas of digital competence are the following:

1. **Information:** identify, locate, retrieve, store, organise and analyse digital information, judging its relevance and purpose.
2. **Communication:** communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.
3. **Content-creation:** Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences.
4. **Safety:** personal protection, data protection, digital identity protection, security measures, safe and sustainable use.
5. **Problem-solving:** identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update one's own and others' competences.

The following table provides an overview of the framework, outlining each competence.

Competence areas Dimension 1	Competences Dimension 2
1. Information	<p>1.1 Browsing, searching and filtering information 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>1.2 Evaluating Information To gather, process, understand and critically evaluate information</p> <p>1.3 Storing and retrieving information To manipulate and store information and content for easier retrieval, to organise information and data</p>
2. Communication	<p>2.1 Interacting through technologies 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>2.2 Sharing information and content 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>2.3 Engaging in online citizenship 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>2.4 Collaborating through digital channels To use technologies and media for team work, collaborative processes and co-construction and co-creation of resources, knowledge and content</p> <p>2.5 Netiquette 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>2.6 Managing digital identity 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>
3. Content creation	<p>3.1 Developing content 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>3.2 Integrating and re-elaborating To modify, refine and mash-up existing resources to create new, original and relevant content and knowledge</p> <p>3.3 Copyright and Licences To understand how copyright and licences apply to information and content</p> <p>3.4 Programming To apply settings, programme modification, programme applications, software, devices, to understand the principles of programming, to understand what is behind a programme</p>

<p>4. Safety</p>	<p>4.1 Protecting devices To protect own devices and to understand online risks and threats, to know about safety and security measures</p> <p>4.2 Protecting personal data 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>4.3 Protecting health To avoid health-risks related with the use of technology in terms of threats to physical and psychological well-being</p> <p>4.4 Protecting the environment To be aware of the impact of ICT on the environment</p>
<p>5. Problem solving</p>	<p>5.1 Solving technical problems To identify possible problems and solve them (from trouble-shooting to solving more complex problems) with the help of digital means</p> <p>5.2 Identifying needs and technological responses 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>5.3 Innovating and creatively using technology 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>5.4 Identifying digital competence gaps 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>

1. Introduction

The recommendation of the European Parliament and the Council (2006) recognized eight key competences for Lifelong Learning: communication in the mother tongue; communication in foreign languages; mathematical competence and basic competences in science and technology; digital competence; learning to learn; social and civic competences; entrepreneurship; and cultural awareness and expression. Digital competence has been confirmed as a relevant priority for the European Commission in more recent policies, actions, and communications (European Commission, 2010a, 2010b).

Moreover, it is recognised that participation in society nowadays requires a set of competences related to technologies, which have started over the last decade to be understood as "life skills", comparable to literacy and numeracy. They have therefore become "both a requirement and a right" (OECD, 2001). The competences and competence areas that are here defined can be seen as components of e-citizenship, thereby addressing the issue of digital divide. It is in fact recognized that participation in the digital domain is no longer a question of "have" or "have not", but rather an issue of competence. Nowadays, digital inclusion depends more on knowledge, skills and attitudes than on access and use (Erstad, 2010). This study will highlight the set of competences that are needed by citizens today for full digital inclusion.

1.1 The aims and objectives of the study

The DIGCOMP study was launched by JRC-IPTS IS Unit⁴ under an Administrative Agreement with DG Education and Culture with a view to contribute to the better understanding and development of Digital Competence in Europe. The aim of the project was to identify exhaustive descriptors of Digital Competence. The project was carried out between January 2011 and December 2012.⁵

The DIGCOMP study set out to create consensus at European level about the components of Digital Competence, by developing a conceptual framework through multi-stakeholder consultations. The DIGCOMP proposal could serve as an umbrella or meta-framework for current frameworks, initiatives, curricula and certifications. We also hope that it can be used to inspire the development of new initiatives with a wider perspective on Digital Competence.

1.2 Methodology

The phases of the study are depicted in Figure 1. The project comprised several steps, some of which included the dissemination of interim results in the form of a report (where this is the case, references are provided):

1. a conceptual mapping of Digital Competence, where the main concepts are discussed and refined (Ala-Mutka, 2011);
2. a case studies collection, where several current Digital Competence frameworks and initiatives are collected and analysed (Ferrari, 2012);
3. an online consultation with stakeholders, where experts' opinions on the basic components of Digital Competence are collected and structured (Janssen & Stoyanov, 2012);
4. an expert workshop to refine the first input of the online consultation and to validate the preliminary approach;
5. a draft proposal for a conceptual framework, where the three previous points are merged and elaborated;

⁴ The Institute for Prospective Technological Studies (IPTs) is one of the seven research institutes that make up the European Commission's Joint Research Centre.

⁵ For more information, see: <http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html>

6. a multi-stakeholder consultation, where consensus is reached and descriptors are refined (involving interviews, dissemination and a workshop);
7. a subsequent final proposal, taking into account the feedback received from stakeholders (the current report).

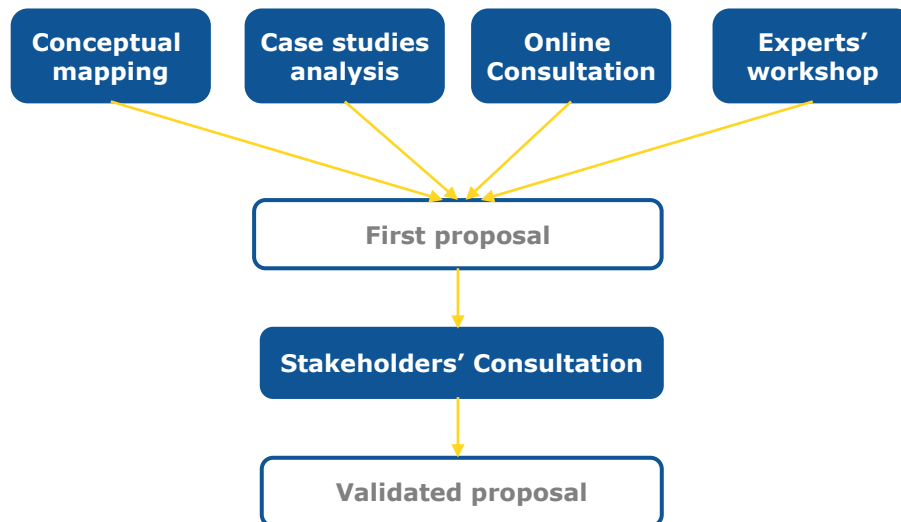


Figure 1: Phases of the DIGCOMP study

The report on the case studies analysed 15 frameworks.⁶ The online consultation collected the contribution of 95 experts from a variety of fields. The experts' workshop involved 17 external participants. Several frameworks, including those analysed in the case study report, have been taken into account in the development of the proposal. About 40 stakeholders contributed to the review of the first proposal (with interviews, reviews of parts of the proposal or of the full proposal, a validation workshop, and several meetings and presentations).

Existing frameworks from international studies in education which are measuring any of the elements of DIGCOMP framework were also taken into consideration (namely: PIAAC, PISA 2012, PISA 2015, ICILS 2013).

The draft descriptors were based on the three preliminary steps of the project as building blocks: the conceptual mapping, the case studies analysis, the online consultation. Each of these building blocks identified areas of digital competence and examples of knowledge, skills and attitudes. As a first move, the different areas identified through each of the previous steps of the project were compared and merged. Afterwards, all the examples of knowledge, skills and attitudes were used to populate these new areas and to refine them. According to the attribution of the examples to specific areas, competences were created by clustering the examples. In certain cases, the phrasing of current frameworks for the development of digital competence were used as examples of good writing or as models for the phrasing of specific competences. The first proposal was subsequently refined and adapted according to the suggestions of stakeholders.

The digital competence framework matrix comprises 5 dimensions (competence areas; competences; proficiency levels; examples of knowledge, skills and attitudes; purposes). The

⁶ Including, in alphabetical order: ACTIC (from Catalonia); BECTA's review of Digital Literacy; Centre for Media Literacy MediaLit Kit; DCA (Digital Competence Assessment); DigEuLit (Digital literacy in the EU); ECDL (European Computer Driving Licence); eLSe-Academy; eSafety Kit; Eshet-Alkalai's conceptual framework; IC3; iSkills; NCCA ICT framework for schools – Ireland; Pedagogic ICT licence –Denmark; The Scottish Information Literacy Project; the UNESCO ICT CFT (competence framework for teachers).

structure was taken and elaborated from the eCompetence framework for ICT professionals (eCF),⁷ which had 4 dimensions. A fifth dimension (purposes) was added as the DIGCOMP framework is meant to be applied to different contexts. This reuse of the eCF structure is based on two arguments:

- the eCF uses a clear structure that has received extensive stakeholders support;
- the use of this structure will allow both projects to be cross-referenced. As this structure was adopted by the e-Competence Framework for ICT Users,⁸ this reinforces the decision to use it as it facilitates alignment between the two parallel projects.

Another framework that has been used as a good example for the elaboration of the DIGCOMP proposal is the Common European Framework of Reference for Languages (CEFR). The CEFR provides a self-assessment grid built on three proficiency levels (each of them is then split into two sub-levels). The CEFR self-assessment grid is also supported by a more extensive toolkit that sets the standards for the evaluation of learning outcomes of foreign languages.

The criteria for establishing levels are loosely based on the descriptors of the EQF (European Qualification Framework).⁹ We decided to go for three levels, and not eight as in the EQF. A general baseline for populating the levels was moving from "being aware and having an understanding of" for A level (foundation); to "being able to use" for B (Intermediate); to "being actively involved in as a practice" for C (Advanced).

1.3 Limitations of the study

This study provides a general overview of the needs of all citizens to be or become competent in a digital society. As the study has very ambitious goal, the limitations should be made clear.

The outputs that are proposed here are the result of an intensive and diversified consultation process. However, this remains a conceptual framework, as it has never been piloted nor implemented. A subsequent step for this proposal would be to try the framework in practice, and to amend and refine it according to feedback from practitioners and users.

Several stakeholders involved in the review of the proposal regard it as a very comprehensive and exhaustive tool. This reflects the complexity of the digital competence domain, which touches upon several aspects of our everyday lives. While this can be seen as an added value of the proposal, it is also true that not all citizens, learners, or users will be interested in developing all the competences that are listed here. It is therefore up to the users, institutions, intermediaries or initiative developers who are willing to use the proposal to adapt it to their needs.

A related challenge of this proposal relates to individual competences versus the general approach we adopted, since there are major differences between age groups or different target groups. The proposal made here can be seen as a start in conceptions and interpretations of digital competence and social practices using digital media, which over time will have to become more elaborated and specified. In order for this proposal to be implemented, there is certainly a need to adapt the competences listed here to the particular needs of a specific target group.

It is also true that the framework structure and visualisation might be quite complex. However, the complexity of the matrix that was used allows for the proposal to be broken into smaller parts. For instance, one could only be interested in the competence areas and their descriptions. Or it might be useful to have an overview of the list of competences. The various dimensions included in the proposal permit a jigsaw reading of the framework according to the interests of the reader. Moreover, the self-assessment grid and the list of competences (with descriptions) provide a more simplified overview of the proposal.

⁷ See: <http://www.ecompetences.eu/>

⁸ A project which has been running in parallel with the DIGCOMP project:
<http://www.cen.eu/cen/Sectors/Sectors/ISSS/Activity/Pages/WSICT-SKILLS.aspx>

⁹ http://ec.europa.eu/education/lifelong-learning-policy/eqf_en.htm

Another challenge that can be encountered in this and other similar frameworks is the rapid changes to the phenomena we are trying to conceptualize. Technological developments are happening fast and it is difficult to conceive how digital competence will develop during the next few years. Just eight years ago, it would have been impossible to conceive the impact of social media, which is now part of our everyday culture and practices. For this reason, competences that are described in this proposal are quite general and abstract. However, there is a need to keep monitoring which new technological innovations might have implications for these competences. As a result, the framework proposed here will need a process of revision that takes into account the implications of new and upcoming technological developments and also new social practices and adoptions.

1.4 Structure of the report

This report presents the results of the DIGCOMP study.

After this first introductory chapter, Chapter 2 provides an overview of the proposed framework, by outlining the areas and digital competences identified and by presenting the self-assessment grid. Chapter 3 presents the full framework, in which we detail the levels of each competence; examples of knowledge, attitudes and skills; and examples of applicability to purpose.

Annex I is a glossary of key terms, Annex II is an outline of all competences with a short description for each one, Annex III provides the cross-references between competences, Annex IV presents suggestions on how to move from a proficiency level to the next, and Annex V provides the cross-references between the key competences for lifelong learning and the competences of this Digital Competence framework.

2. Overview of the DIGCOMP Proposal

The DIGCOMP proposal consists of two different interrelated outputs:

- **a self-assessment grid** that proposes the areas of Digital Competence and descriptors for three proficiency levels;
- **a framework** identifying, for each area, all the related competences, and providing for each competence a general description, descriptors on three levels, examples of the knowledge, attitudes and skills, and examples of applicability for different purposes.

These two outputs provide a different level of granularity of the same construct.

The self-assessment grid could be used as a tool for each citizen to describe their own level of digital competence to third parties and to understand how to improve their own digital competence. Indicators for development are provided in Annex IV for allowing easier identifications of the steps that need to be taken when moving from a proficiency level to another. The self-assessment grid can also be used as a communication tool, as it presents the model in a concise and easy-to-grasp way.

The framework could be used by curricula and initiative developers who want to develop the digital competence of a specific target group, and could be inspired by or gain ideas from this model. The level of abstraction of the competences that are foreseen in the framework allows stakeholders to refine and specify sub-competences in the terms they consider most appropriate for the target groups or context. The framework could also be used as a reference tool to compare existing frameworks and initiatives, in order to map which areas and which levels are taken into account by a currently existing framework (or certification scheme, or syllabi).

The shell of the DIGCOMP framework is structured in five dimensions. These dimensions reflect a different aspect of the descriptors and a different stage of granularity.

- Dimension 1:** competence areas that have been identified
- Dimension 2:** competences that are pertinent to each area
- Dimension 3:** proficiency levels that are foreseen for each competence
- Dimension 4:** examples of the knowledge, skills and attitudes applicable to each competence (examples are not differentiated in proficiency levels)
- Dimension 5:** Examples on the applicability of the competence to different purposes. Within this report, examples for Learning and Employment are provided. Other dimensions that can be considered are: Leisure; Social; Buying and Selling; Learning; Employment; Citizenship; Well-being.

The self-assessment grid comprises Dimension 1 and 3 of the framework. This means that each competence area is unravelled into three proficiency levels that implicitly take into account the competences that belong to the area they refer to.

2.1 Areas and competences

The areas of digital competence can be summarised as follows:

Information: identify, locate, retrieve, store, organise and analyse digital information, judging its relevance and purpose.

Communication: communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.

Content-creation: Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences.

Safety: personal protection, data protection, digital identity protection, security measures, safe and sustainable use.

Problem-solving: identify digital needs and resources, make informed decisions on most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update own and other's competence.

Areas 1, 2 and 3 are rather linear while areas 4 and 5 are more transversal. This means that while areas 1 to 3 deal with competences that can be re-traced in terms of specific activities and uses, areas 4 and 5 apply to any type of activity that is been carried out through digital means. This does not mean that areas 1, 2, and 3 are not inter-related. Although each area has its own specificity, there are several forced overlapping points and cross-references to other areas. At this point we need to discuss "Problem solving" (area 5), competence area which is the most transversal of all. In the framework it is a stand-alone competence area, but on the other hand elements of problem solving can be found in all of the competence areas. For instance, 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-elaborating, 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.

For each of the above competence areas, a series of related competences has been identified. Competences in each area vary in number from a minimum of 3 to a maximum of 6. Competences are numbered, however the progression does not refer to a different degree of attainment (proficiency levels are foreseen in Dimension 3). The first competence in each area is always the

one that includes more technical aspects: in these specific competences, the knowledge, skills and attitudes have operational processes as a dominant component. However, technical and operational skills are also and embedded in each competence.

Table 3 lists the competence areas (Dimension 1) and the competences (Dimension 2).

Table 3: Overview of Dimensions 1 and 2

Dimension 1	Dimension 2
Competence areas	Competences
1. Information	1.1 Browsing, searching and filtering information 1.2 Evaluating information 1.3 Storing and retrieving information
2. Communication	2.1 Interacting through technologies 2.2 Sharing information and content 2.3 Engaging in online citizenship 2.4 Collaborating through digital channels 2.5 Netiquette 2.6 Managing digital identity
3. Content creation	3.1 Developing content 3.2 Integrating and re-elaborating 3.3 Copyright and licences 3.4 Programming
4. Safety	4.1 Protecting devices 4.2 Protecting personal data 4.3 Protecting health 4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Innovating and creatively using technology 5.4 Identifying digital competence gaps

A point that needs to be underlined here: the framework we propose wants to be descriptive rather than prescriptive. There are several aspects of digital competence that are delicate and controversial, for instance all the activities that might include/foresee legal and ethical issues. The creation of "prescriptive" standards could be contradictory: for example, one cannot judge an individual to be incompetent because of illegal downloading. The person who decides to illegally download content might be very competent and very aware of the licences and rules she is breaking and the consequences that the act entails. Therefore, in this framework what we propose is a mapping of the competences that touch those aspects, not of the desirable behaviour that is expected from the citizen. Ethical aspects are also included in terms of competences (i.e. knowledge of rather than correct behaviour). We therefore raise the issue but believe it is up to implementation initiative to define this competence in more prescriptive terms if they wish so.

2.2 The self-assessment grid

The self-assessment grid consists of 5 areas of digital competence and three proficiency levels, going from A (foundation level), to B (intermediate level) to C (advanced level).

The five areas were used as the basis of the two main outputs of the project: the self-assessment grid and the detailed framework. According to the description of the areas, three proficiency levels were developed for each area, in an attempt to give a general overview of the area content, summarising the model at a more abstract, general level as in the CEFR for Languages.

In each row, several items can be recognised that correspond to the same competence.

	A - Foundation	B- Intermediate	C- Advanced
Information	I can do some online searches through search engines. I know how to save or store files and content (e.g. texts, pictures, music, videos, and web pages). I know how to go back to the content I saved. I know that not all online information is reliable.	I can browse the internet for information and I can search for information online. I can select the appropriate information I find. I can compare different information sources. I know how to save, store or tag files, content and information and I have my own storing strategy. I can retrieve and manage the information and content I saved or stored.	I can use a wide range of strategies when searching for information and browsing on the Internet. I am critical about the information I find and I can cross-check and assess its validity and credibility. I can filter and monitor the information I receive. I can apply different methods and tools to organise files, content and information. I can deploy a set of strategies for retrieving and managing the content I or others have organised and stored. I know whom to follow in online information sharing places (e.g. micro-blogging).
Communication	I can interact with others using basic features of communication tools, (e.g. mobile phone, VoIP, chat or email). I know basic behaviour norms that apply when communicating with others using digital tools. I can share files and content with others through simple technological means. I know that technology can be used to interact with services and I passively use some. I can collaborate with others using traditional technologies. I am aware of the benefits and risks related to digital identity.	I can use several digital tools to interact with others using more advanced features of communication tools (e.g. mobile phone, VoIP, chat, email). I know the principles of online etiquette and I am able to apply them in my own context. I can participate in social networking sites and online communities, where I pass on or share knowledge, content and information. I can actively use some basic features of online services. I can create and discuss outputs in collaboration with others using simple digital tools. I can shape my online digital identity and keep track of my digital footprint.	I am engaged in the use of a wide range of tools for online communication (emails, chats, SMS, instant messaging, blogs, micro-blogs, SNS). I can apply the various aspects of online etiquette to different digital communication spaces and contexts. I have developed strategies to discover inappropriate behaviour. I can adopt digital modes and ways of communication that best fit the purpose. I can tailor the format and ways of communication to my audience. I can manage the different types of communication I receive. I can actively share information, content and resources with others through online communities, networks and collaboration platforms. I am actively participating in online spaces. I know how to get actively engaged in online participation and I can use several different online services. I frequently and confidently use several digital collaboration tools and means to collaborate with others in the production and sharing of resources, knowledge and content. I can manage several digital identities according to the context and purpose, I can monitor the information and data I produce through my online interaction, I know how to protect my digital reputation.
Content creation	I can produce simple digital content (e.g. text, or tables, or images, or audio, etc.). I can make basic changes to the content that others have produced. I can modify some simple function of software and applications (apply basic settings). I know that some of the content I find can be covered by copyright.	I can produce digital content in different formats (e.g. text, tables, images, audio, etc.). I can edit, refine and modify the content I or others have produced. I have basic knowledge of the differences between copyright, copyleft and creative commons and I can apply some licences to the content I create. I can apply several modifications to software and applications (advanced settings, basic programme modifications).	I can produce digital content in different formats, platforms and environments. I can use a variety of digital tools for creating original multimedia outputs. I can mash-up existing items of content to create new ones. I know how different types of licences apply to the information and resources I use and create. I can interfere with (open) programmes, modify, change or write source code, I can code and programme in several languages, I understand the systems and functions that are behind programmes.
Safety	I can take basic steps to protect my devices (for instance: by using anti-viruses, passwords, etc.). I know that I can only share certain types of information about myself or others in online environments. I know how to avoid cyber bullying. I know that technology can affect my health, if misused. I take basic measures to save energy.	I know how to protect my digital devices, I update my security strategies. I can protect my and others online privacy. I have a general understanding of privacy issues and I have basic knowledge of how my data is collected and used. I know how to protect myself and others from cyber bullying. I understand the health risks associated with the use of technologies (from ergonomic aspects to addiction to technologies). I understand the positive and negative aspects of the use of technology on the environment.	I frequently update my security strategies. I can take action when the device is under threat. I often change the default privacy settings of online services to enhance my privacy protection. I have an informed and wide understanding of privacy issues and I know how my data is collected and used. I am aware of the correct use of technologies to avoid health problems. I know how to find a good balance between online and off-line worlds. I have an informed stance on the impact of technologies on everyday life, online consumption, and the environment.
Problem solving	I can ask for targeted support and assistance when technologies do not work or when using a new device, programme or application. I can use some technologies to solve routine tasks. I can make decisions when choosing a digital tool for a routine practice. I know that technologies and digital tools can be used for creative purposes and I can make some creative use of technologies. I have some basic knowledge, but I am aware of my limits when using technologies.	I can solve easy problems that arise when technologies do not work. I understand what technology can do for me and what it cannot. I can solve a non-routine task by exploring technological possibilities. I can select an appropriate tool according to the purpose and I can evaluate the effectiveness of the tool. I can use technologies for creative outputs and I can use technologies to solve problems. I collaborate with others in the creation of innovative and creative outputs, but I don't take the initiative. I know how to learn to do something new with technologies.	I can solve a wide-range of problems that arise from the use of technology. I can make informed decisions when choosing a tool, device, application, software or service for the task I am not familiar with. I am aware of new technological developments. I understand how new tools work and operate. I can critically evaluate which tool serves my purposes best. I can solve conceptual problems taking advantage of technologies and digital tools, I can contribute to knowledge creation through technological means, I can take part in innovative actions through the use of technologies. I proactively collaborate with others to produce creative and innovative outputs. I frequently update my digital competence needs.

3. The Digital Competence Framework

This chapter provides, in a tabular view, the detailed Digital Competence framework. For each area of Digital Competence we propose a description of the area; and a list of competences that belong to that area. For every competence, we have detailed a description of the competence, three proficiency levels, a list of examples of the knowledge, attitudes and skills that can illustrate the competence (although the list is not exhaustive) and the applicability of these competence for two selected purposes (namely: learning and employment).

3.1 Area 1: Information

General description:

Identify, locate, retrieve, store, organise and analyse digital information, judging its relevance and purpose.

Competences:

- 1.1 Browsing, searching and filtering information
- 1.2 Evaluating information
- 1.3 Storing and retrieving information

Dimension 1	Information		
Name of area			
Dimension 2	1.1 Browsing, searching and filtering information		
Competence title and description	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		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can do some online searches through search engines. I know that different search engines can provide different results.	I can browse the internet for information and I can search for information online. I can articulate my information needs and I can select the appropriate information I find.	I can use a wide range of search strategies when searching for information and browsing on the Internet. I can filter and monitor the information I receive. I know whom to follow in online information sharing places (e.g. micro-blogging).
Dimension 4			
Knowledge examples	<p>Understands how information is generated, managed and made available</p> <p>Is aware of different search engines</p> <p>Understands which search engines or databases best answer to his/her own information needs</p> <p>Understands how information can be found in different devices and media</p> <p>Understands how search engines classify information</p> <p>Understands how feeds mechanism works</p> <p>Understands indexing principles</p>		
Skills examples	<p>Adjusts searches according to specific needs</p> <p>Can follow information presented in hyper-linked and non-linear form</p> <p>Can use filters and agents</p> <p>Is able to search for words that limit the number of hits</p>		

	Can refine information searches and selects controlled vocabulary specific to the search tool		
	Has strategic information skills for goal oriented activities		
	Can modify information searches according to how algorithms are built		
	Is able to adapt search strategies to a specific search engine, application or device		
Attitude examples	Has a proactive attitude towards looking for information		
	Values the positive aspects of technologies for information retrieval		
	Is motivated to seek information for different aspects in his/her life		
	Is curious about information systems and their functioning		
Dimension 5			
Application to purpose			
Learning	I can use a search engine to find details about a specific type of heat energy.	I can find a range of sources of information about a specific form of heat energy by entering proper key words, and I can use a refined search to locate the most appropriate sources.	I can find a range of sources of information about a specific form of heat energy using different search engines and advanced searches, and I can also use online databases and searches through linked references.
Employment	I can find details of flights using a common search engine.	I can find details of flights using a number of search engines, and a number of airline company websites, selecting details that relate to scheduled times.	I can find details of flights using a number of search engines, airline company web sites, and web sites that compare details of many airline companies, including costs and scheduled times.

Dimension 1	Information		
Name of area			
Dimension 2	1.2 Evaluating information		
Competence title and description	To gather, process, understand and critically evaluate information		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I know that not all online information is reliable.	I can compare different information sources.	I am critical about the information I find and I can cross-check and assess its validity and credibility.
Dimension 4			
Knowledge examples	Can analyse retrieved information		
	Evaluates media content		
	Judges the validity of content found on the internet or the media, evaluates and interprets information		
	Understands the reliability of different sources		
	Understands online and offline information sources		
	Understands that information sources need to be cross-checked		
	Can transform information into knowledge		

	Understands power forces in the online world
Skills examples	<p>Is able to deal with information pushed at the user</p> <p>Assesses the usefulness, timeliness, accuracy and integrity of the information</p> <p>Can compare, contrast, and integrate information from different sources</p> <p>Distinguishes reliable information from unreliable sources</p>
Attitude examples	<p>Recognises that not all information can be found on the Internet</p> <p>Is critical about information found</p> <p>Is aware that despite globalisation certain countries are more represented on the Internet</p> <p>Is aware that search engine mechanism and algorithms are not necessarily neutral in displaying the information</p>

Dimension 5

Application to purpose

Learning	I have found some information from different sources about society in the 1500s, but I'm not sure how to judge its value.	I have found a range of different sources about society in the 1500s, and I've looked for the origins of the material as a way to judge their value.	I have found a range of different sources about society in the 1500s, I've looked for the sources they originate from, I've removed some because the academic nature of the sources is not clear, and I've checked details across the sources to see how valid they may be.
	Employment	I have been asked to look at sales of certain products, but I'm not sure how reliable the figures that I've obtained are.	I have been asked to look at sales of certain products, and I've checked the sources of figures that I've obtained so I have an idea of how reliable they may be.

Dimension 1 Information

Name of area

Dimension 2 1.3 Storing and retrieving information

Competence title and description
To manipulate and store information and content for easier retrieval, to organise information and data

Dimension 3

Proficiency levels

A - Foundation

I know how to save files and content (e.g. texts, pictures, music, videos, and web pages). I know how to go back to the content I have saved.

B- Intermediate

I can save, store or tag files, content and information and I have my own storing strategy. I can retrieve and manage the information and content I have saved or stored.

C- Advanced

I can apply different methods and tools to organise files, content, and information. I can deploy a set of strategies for retrieving the content I or others have organised and stored.

Dimension 4			
Knowledge examples	<p>Understands how information is stored on different devices/services</p> <p>Can enumerate different storage media</p> <p>Knows different storage options and can select the most appropriate</p>		
Skills examples	<p>Structures and classifies information and content according to a classification scheme/method</p> <p>Organizes information and content</p> <p>Downloads/Uploads and classifies information and content</p> <p>Uses various classification schemes to store and manage resources and information</p> <p>Is able to use information management services, software and applications</p> <p>Is able to retrieve and access previously stored information and content</p> <p>Is able to tag content</p>		
Attitude examples	<p>Realises benefits and shortfalls of different storage devices/services (online and local storage options)</p> <p>Is aware about the importance of back-ups</p> <p>Acknowledges the importance of having an understandable and pragmatic storage system/scheme</p> <p>Is aware of consequences when storing content as private or as public</p>		
Dimension 5			
Application to purpose			
Learning	I have created notes about solid states, and I've saved the text and images onto the desktop.	I have created notes about solid states, and I've saved these in different file formats into organised named folders.	I have created notes about solid states, and I've saved these into folders on my hard drive and also in a file hosting service (cloud storage), which will allow me and others to retrieve and share them easily.
Employment	I handle aspects of marketing, and I know how to save files that are created in text, pdf or video format.	I can save text, pdf and video formats of marketing material and file these into named folders so I can find them easily later.	I have saved text, pdf, video and audio files of marketing material, and back-up copies from my hard drive onto a shared file drive for others to access, and into a file hosting service (cloud storage) for personnel in other regions and countries to access and share easily.

3.2 Area 2: Communication

General description:

Communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.

Competences:

- 2.1 Interacting through technologies
- 2.2 Sharing information and content
- 2.3 Engaging in online citizenship
- 2.4 Collaborating through digital channels
- 2.5 Netiquette
- 2.6 Managing digital identity

Dimension 1	Communication		
Name of area			
Dimension 2	2.1 Interacting through technologies		
Competence title and description	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		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can interact with others using basic features of communication tools, (e.g. mobile phone, VoIP, chat or email).	I can use several digital tools to interact with others using more advanced features of communication tools (e.g. mobile phone, VoIP, chat, email).	I am engaged in the use of a wide range of tools for online communication (emails, chats, SMS, instant messaging, blogs, micro-blogs, SNS). I can adopt digital modes and ways of communication that best fit the purpose. I can tailor the format and ways of communication to my audience. I can manage the different types of communication I receive.
Dimension 4			
Knowledge examples	<p>Is aware of different digital communication means (e.g. email, chat, VoIP, video-conference, SMS)</p> <p>Knows how messages and emails are stored and displayed</p> <p>Knows the functionality of several communication software packages</p> <p>Knows the benefits and limits of different means of communications and distinguishes the most appropriate ones to the context</p>		
Skills examples	<p>Is able to send an email, write a blog post, an SMS</p> <p>Is able to find and contact peers</p> <p>Is able to edit information in order to communicate it through several means (from sending an email to making a presentation in slides)</p> <p>Evaluates his/her audience and can tailor communication according to audience</p> <p>Is able to filter the communication he/she receives (for instance, sorting out emails, deciding whom to follow on micro-blogging social sites, etc)</p>		

Attitude examples	<p>Is confident and comfortable in communicating and expressing through digital media</p> <p>Is aware of the code of conduct appropriate to the context</p> <p>Is aware of the risks linked with online communication with unknown people</p> <p>Is actively engaged in online communication</p> <p>Is willing to select the most appropriate communication means according to the purpose</p>
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Dimension 5			
Application to purpose			
Learning	I use a chat or a discussion forum to communicate with other students on my course.	I use a chat to communicate with other students, when necessary I can also use a group chat and moderate it. When needed, I also use VoIP to talk to other students.	I use several communication tools to communicate with other students (mobile phone, VoIP, chat or email). I use several features of VoIP – when I work on a project with other students: I can use screen share feature, I can also record a conversation and broadcast it. I know which communication tool to select, depending on the purpose and the size of the audience.
Employment	I handle travel arrangements and use a mobile telephone and email to communicate with others.	When I handle travel arrangements I use a mobile telephone a lot, but also use email and VoIP to communicate with some people. I can organize a discussion with more participants using VoIP.	When I travel I use several communication tools (e.g. mobile phone, VoIP, chat or email), I can organise a meeting using VoIP, using different features (file, screen sharing, recording the conversation), I can also run a video-conference among remote sites and moderate it. I know when to use VoIP and when videoconference tools.

Dimension 1	Communication								
Name of area									
Dimension 2	2.2 Sharing information and content								
Competence title and description	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								
Dimension 3	<table border="1"> <thead> <tr> <th>A - Foundation</th> <th>B- Intermediate</th> <th>C- Advanced</th> </tr> </thead> <tbody> <tr> <td>I can share files and content with others through simple technological means (e.g. sending attachments to emails, uploading pictures on the internet, etc.)</td> <td>I can participate in social networking sites and online communities, where I pass on or share knowledge, content and information.</td> <td>I can actively share information, content and resources with others through online communities, networks and collaboration platforms.</td> </tr> </tbody> </table>			A - Foundation	B- Intermediate	C- Advanced	I can share files and content with others through simple technological means (e.g. sending attachments to emails, uploading pictures on the internet, etc.)	I can participate in social networking sites and online communities, where I pass on or share knowledge, content and information.	I can actively share information, content and resources with others through online communities, networks and collaboration platforms.
A - Foundation	B- Intermediate	C- Advanced							
I can share files and content with others through simple technological means (e.g. sending attachments to emails, uploading pictures on the internet, etc.)	I can participate in social networking sites and online communities, where I pass on or share knowledge, content and information.	I can actively share information, content and resources with others through online communities, networks and collaboration platforms.							
Proficiency levels									
Dimension 4									
Knowledge examples	Knows the benefits (for him/herself as well as for others) of sharing content and information with peers								

	Judges the value of the resource to be shared and the target audience to share it with Knows which content/knowledge/resources can be publicly shared Knows how/when to acknowledge the source of a particular content
Skills examples	Is able to check the property right of content Knows how to share content found on the internet (e.g. how to share a video within a social networking site) Knows how to use social media to promote results of their work
Attitude examples	Takes a proactive attitude in the sharing of resources, content and knowledge Has his/her own informed opinion about sharing practices, benefits, risks and limits Has an informed opinion on authoring practices Is aware of copyright issues

Dimension 5			
Application to purpose			
Learning	When I complete an assignment for a course, I send it to my tutor as an email attachment.	When I complete an assignment, I use a social networking site to ask colleagues to review it, and then make it accessible to my tutor.	I use online communities to share a completed assignment with other students. I'm careful to make sure that their contributions are appropriately recognised before I submit the assignment to my tutor.
	Employment	I share documents that are in draft form with other personnel in the company, sending them by email as file attachments.	I share documents that are in draft form with other personnel in the company, perhaps sending them as attached files if their distribution is limited, or I share them through our networking site if the distribution is for wider groups.

Dimension 1	Communication		
Name of area			
Dimension 2	2.3 Engaging in online citizenship		
Competence title and description	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		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I know that technology can be used to interact with services and I passively use some (e.g.: online communities, government, hospital or medical centres, bank).	I can actively use some basic features of online services (e.g.: government, hospital or medical centres, bank, eGovernment services, etc).	I am actively participating in online spaces. I know how to get actively engaged in online participation and I can use several different online services.

Dimension 4	
Knowledge examples	Knows that technology can be used for engagement in democratic actions (e.g. lobbying, petitions, parliament) Knows how technologies and media can enable different forms of participation
Skills examples	Is able to access a number of relevant networks and communities for different purposes Is able to find relevant communities, networks, and social media that correspond to his/her interests and needs Knows and can use the different functionalities of networks, media, and online services
Attitude examples	Is aware of the potential of technologies and media for participation Has a critical understanding of social media, networks and online communities Engages in participatory media

Dimension 5			
Application to purpose			
Learning	If I want to take a new course, I know that I can search online for one to match my interests and needs, and that I'll be able to ask questions and get details from institutions that offer appropriate courses.	I have searched for appropriate courses, and I've sent some queries to a few selected institutions, so that I can apply online.	I am enrolled on a course, and I've also completed details so that I have a presence on the institution's social site that can be seen by others who might have similar interests.
Employment	As an employee, I use trade union web pages, where I occasionally read news, information and regulations in the field.	I have applied online to become a member of a trade union. I use the services e.g. news feed; I regularly read news, information and regulations in the field.	I actively participate in online trade union portal, I engage in civic activities (like signing petitions) and using services such as legal aid.

Dimension 1	Communication		
Name of area			
Dimension 2	2.4 Collaborating through digital channels		
Competence title and description	To use technologies and media for team work, collaborative processes and co-construction and co-creation of resources, knowledge and content		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can collaborate with others using traditional technologies (e.g. email).	I can create and discuss outputs in collaboration with others using simple digital tools.	I frequently and confidently use several digital collaboration tools and means to collaborate with others in the production and sharing of resources, knowledge and content.
Dimension 4			
Knowledge examples	Knows that collaborative processes facilitate content creation Knows when content creation can benefit from collaborative processes and when not Understands the dynamics of collaborative work and of giving and receiving feedback		

	Can judge the contribution of others to his/her own work Has an understanding of different roles needed in diverse forms of online collaboration
Skills examples	Is able to use the collaborative features of software packages and web-based collaborative services (e.g. track changes, comments on a document or resource, tags, contribution to wikis, etc.) Is able to give and receive feedback Can work at a distance with others Can use social media for different collaborative purposes
Attitude examples	Is willing to share and collaborate with others Is ready to function as part of a team Seeks new forms of collaboration that are not necessarily based on a previous face-to-face engagement

Dimension 5			
Application to purpose			
Learning	4. I need to collaborate with others on a project for a course, and I know that it is possible and effective to use technology to help with this.	I have started to work on our project, and I have created a file that I have shared with others, so that they can offer comments and add material to it.	I have put a document into an online collaboration tool, so that others can amend it and add to it, and the system will notify me about the changes that have been made.
Employment	5. I need to create a project document on finance in collaboration with others in the company, and know that I can use technology to help with this.	I have created a draft project document on finance, and have shared it with others so that they can comment on it and add material to it.	I have created a draft project document on finance, and put it into an online collaboration tool, so that the others working on it with me can amend it and add to it. The system will alert me to the changes when these are being made, so that I can collaborate with them synchronously if I wish.

Dimension 1	Communication		
Name of area			
Dimension 2	2.5 Netiquette		
Competence title and description	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		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I know basic behaviour norms that apply when communicating with others using digital tools.	I know the principles of online etiquette and I am able to apply them in my own context.	I can apply the various aspects of online etiquette to different digital communication spaces and contexts. I have developed strategies to discover inappropriate behaviour.
Dimension 4			
Knowledge examples	Knows about agreed practices in digital interactions		

	<p>Understands the consequences of own behaviour</p> <p>Knows about ethical issues in digital media, such as visiting improper websites and cyber bullying</p> <p>Understands that different cultures have different communication and interaction practices</p>
Skills examples	<p>Has the ability to protect him/herself and others from online threats</p> <p>Is able to ban/report abuse and threats</p> <p>Has developed strategies for handling cyber bullying and for discovering inappropriate behaviour</p>
Attitude examples	<p>Considers ethical principles of use and publication of information</p> <p>Has an advanced sense of suitable behaviour, finely tuned to media context, audience and legal provisions</p> <p>Reveals flexibility and adaptation to different digital communications cultures</p> <p>Accepts and appreciates diversity</p> <p>Has a safe and sensible attitude in digital activities</p>

Dimension 5			
Application to purpose			
Learning	I am aware that comments sent to my tutor should be in no way offensive.	I always re-read messages to ensure that comments are not offensive or unethical, and if I receive such comments from others, I know how to block their messages or who to inform about the problem.	I have read official material online about ethical practices, and have also attended online sessions to keep up-to-date about any new issues which arise.
Employment	I am aware that comments placed on the company websites should be in no way offensive.	I always re-read messages that are placed on our company websites to ensure that comments are not offensive or unethical, and if I receive such comments from others, I know how to block their messages or who to inform about the problem.	I have read official material online about ethical practices, and have also attended online sessions to keep up-to-date about any new issues which arise, particularly relating to business and commerce.

Dimension 1	Communication		
Name of area			
Dimension 2	2.6 Managing digital identity		
Competence title and description	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		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I am aware of the benefits and risks related to digital identity.	I can shape my online digital identity and keep track of my digital footprint.	I can manage several digital identities according to the context and purpose, I can monitor the information and data I produce through my online interaction, I know how to protect my digital reputation.
Dimension 4			
Knowledge	Knows the benefits of having one or more digital identities		

examples	Understands the interlinks between the online and offline world Understands that several actors can positively or negatively contribute to construct his/her digital identity		
Skills examples	Has the ability to protect him/herself and others from online threats to their e-reputation Is able to construct a profile that benefits his/her needs Can track his/her own digital footprint		
Attitude examples	Is aware of the benefits and risks related to online identity exposure Is not afraid to disclose certain type of information about self Considers multiple ways of expressing his./her own identity and personality through digital means		
Dimension 5			
Application to purpose			
Learning	I understand that people might have an idea of my personality through what I share on the school portal..	I keep track of the things I share on the school portal to create an e-reputation	I have different identities that I apply to the learning spaces and virtual community I participate in for improving my learning.
Employment	I am aware that I can have a public profile on a social network for people in professional occupations.	I have a profile on a social network that I use for professional purposes and I only share professional information through that profile.	I manage my professional profile and use online services to keep track of the projects I am involved in and the work I produce.

5.1 Area 3: Content creation

General description:

Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences.

Competences:

- 3.1 Developing content
- 3.2 Integrating and re-elaborating
- 3.3 Copyright and Licences
- 3.4 Programming

Dimension 1	Content creation		
Name of area			
Dimension 2	3.1 Developing content		
Competence title and description	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		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can create simple digital content (e.g. text, or tables, or	I can produce digital content in different formats, including	I can produce digital content in different formats, platforms and environments. I can use a

	images, or audio, etc.).	multimedia (e.g. text, tables, images, audio, etc.).	variety of digital tools for creating original multimedia outputs
Dimension 4			
Knowledge examples	<p>Knows that digital content can be produced in a variety of forms</p> <p>Knows which software/application fits better the kind of content s/he wants to create</p> <p>Understands how meaning is produced through multimedia (text, images, audio, video)</p>		
Skills examples	<p>Is able to use basic packages to create content in different forms (text, audio, numeric, images)</p> <p>Is able to create knowledge representations (e.g. mind maps, diagrams) using digital media.</p> <p>Is able to use a variety of media to express him/herself creatively (text, images, audio, and movie).</p> <p>Is able to edit the content in order to enhance the final output</p>		
Attitude examples	<p>Is not content with commonly used forms of content creation but explores new ways and formats</p> <p>Sees the potential of technologies and media for self-expression and knowledge creation</p> <p>Values the added value of new media for cognitive and creative processes</p> <p>Is critical about knowledge production and consumption with media and technologies</p> <p>Creates with confidence media content and expressions</p> <p>Engages with creative content</p>		
Dimension 5			
Application to purpose			
Learning	I need to present my ideas to others in the class, and can use technology to do this creatively.	I need to present my ideas to others in the class, and I can use presentation software, images, video and music to do this creatively.	I need to present my ideas to others in the class, and know how to integrate audio, text, images, video and music in film formats.
Employment	I need to present my ideas to the project team, and I can use technology to do this creatively.	I need to present my ideas to the project team, and can use presentation software, images, video and music to do this creatively.	I need to present my ideas to the project team, and know how to integrate audio, text, images, video and music in film formats.

Dimension 1	Content creation		
Name of area			
Dimension 2	3.2 Integrating and re-elaborating		
Competence title and description	To modify, refine and mash-up existing resources to create new, original and relevant content and knowledge		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can make basic changes to the content that others have produced.	I can edit, refine and modify the content I or others have produced.	I can mash-up existing items of content to create new ones.
Dimension 4			
Knowledge examples	<p>Contributes to the public knowledge domain (e.g. wikis, public forums, reviews)</p> <p>Knows that resources can be built from diverse and non-sequential information sources</p> <p>Knows about different databases and resources that can be remixed and re-used</p> <p>Know that content should be referenced</p>		
Skills examples	<p>Is able to use edit functions to modify content in simple, basic ways</p> <p>Is able to create knowledge representations (e.g. mind maps, diagrams) using digital media</p> <p>Is able to use appropriate licences for authoring and sharing content</p> <p>Is able to remix different existing content into something new</p>		

	Can create new by mixing and matching old		
Attitude examples	Is critical in the selection of content and resources to be re-elaborated Judges and appreciates the work of others Awareness of existing repositories (e.g.: Open Educational Resources - OER)		
Dimension 5			
Application to purpose			
Learning	I can edit the first draft of an assignment I produce and accept the track changes of my tutor.	When I produce an assignment I often integrate material that I've created with figures or tables from other sources that I cite to illustrate certain points in my argument	When I produce an assignment I can use software that allows me to draw data from existing sources through links, without needing to copy and paste it
Employment	I can edit the newsletter draft texts that my colleague sent me for revision	I need to create a new company newsletter every month, and I combine material from different sources that are sent to me	I need to create a new company newsletter every month, and I use a template that allows me to draw data from sources that are sent to me, without needing to copy and paste them

Dimension 1	Content creation		
Name of area			
Dimension 2	3.3 Copyright and licences		
Competence title and description	To understand how copyright and licences apply to information and content		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I know that some of the content I use can be covered by copyright.	I have basic knowledge of the differences about copyright, copyleft and creative commons and I can apply some licences to the content I create.	I know how different types of licences apply to the information and resources I use and create.
Dimension 4			
Knowledge examples	Considers licences regulation principles of use and publication of information. Understands copyright and licence rules Knows there are different ways of licensing intellectual property production Understands differences between copyright, creative commons, copyleft and public domain licences		
Skills examples	Knows how to licence own digital production Knows how to find information on copyright and licence rules		
Attitude examples	Takes a critical stand towards legal frames and regulations Behaves independently and assumes responsibility for own behaviour and choices		
Dimension 5			
Application to purpose			
Learning	I know that certain behaviour is illegal such as downloading copyright material without permission.	I understand if the educational material I am using is covered by copyright or not and I understand which rights apply to the assignments I produce.	I can apply different licences to the material I produce for learning and I have looked in detail at laws that relate to illegal online educational practices.
Employment	I know the consequences of	I have an intuitive knowledge of laws that apply to business	I have been online and have attended specialist online

	making comments about competitors that might be construed as defamatory or negative.	and commercial practices online use.	sessions looking at laws that relate to illegal business and commercial online practices.
Dimension 1	Content creation		
Name of area			
Dimension 2	3.4 Programming		
Competence title and description	To apply settings, programme modification, programme applications, software, devices, to understand the principles of programming, to understand what is behind a programme.		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can modify some simple function of software and applications (apply basic settings).	I can apply several modifications to software and applications (advanced settings, basic programme modifications).	I can interfere with (open) programmes, modify, change or write source code, I can code and programme in several languages, I understand the systems and functions that are behind programmes.
Dimension 4			
Knowledge examples	Knows how digital systems and processes work Knows how software works Understands technological ecosystems Knows about the architectural principles behind technologies		
Skills examples	Creates complex models, simulations and visualisations of the real world using digital information Is able to code and programme digital devices Can change basic settings Can apply advanced settings		
Attitude examples	Is aware of the processes behind computational thinking Is aware he/she can apply settings to most of the existing software Is curious about the potential of ICT for programming and creation of outputs		
Dimension 5			
Application to purpose			
Learning	I can modify the style template of the text editor I am using.	I can use open software to create my own reference library.	I can create a new reference software that suits my needs.
Employment	I can modify the webpage of my company that has been set by somebody else.	I can create a basic webpage with the help of user-friendly web editing tools.	I can programme webpages using different programming languages.

5.2 Area 4: Safety

General description:

Personal protection, data protection, digital identity protection, security measures, safe and sustainable use

Competences:

- 4.1 Protecting devices
- 4.2 Protecting data and digital identity
- 4.3 Protecting health
- 4.4 Protecting the environment

Dimension 1	Safety		
Name of area			
Dimension 2	4.1 Protecting devices		
Competence title and description	To protect own devices and to understand online risks and threats, to know about safety and security measures		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can use basic steps to protect my devices (for instance: using anti-viruses, passwords, etc.).	I know how to protect my digital devices, I update my security strategies.	I frequently update my security strategies. I can take action when the device is under threat.
Dimension 4			
Knowledge examples	Knows that there are several risks associated with the use of technologies Knows about current and up-to-date strategies to avoid risks Understands the risks associated with online use		
Skills examples	Is able to install an anti-virus is able to take steps to mitigate risk of fraud by using a password Is able to protect different devices from threats of the digital world (malware, viruses etc.)		
Attitude examples	Has a positive but realistic attitude towards the benefits and risks associated with online technologies		
Dimension 5			
Application to purpose			
Learning	I know school computers have to have good antivirus software, because many students use internet on the same computer.	If I use my device on school free WiFi, I always try to secure my access (using VPN).	I use different passwords for accessing the school computers and services and I often change my passwords.
Employment	I have a strong password set on my computer at the office, so only I can access it.	If I am installing a software from the internet on my work PC, I use services, which can scan the file online.	When I am using cloud storage services for sharing, I encrypt the files with the most confidential work information.

Dimension 1	Safety		
Name of area			
Dimension 2	4.2 Protecting personal data		
Competence title and description	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		
Dimension 3	A	B	C
Proficiency levels	I know that I can only share certain types of information about myself or others in online environments.	I can protect my and others online privacy. I have a general understanding of privacy issues and I have basic knowledge of how my data is collected and used.	I often change the default privacy settings of online services to enhance my privacy protection. I have an informed and wide understanding of privacy issues and I know how my data is collected and used.
Dimension 4			
Knowledge examples	Understands the terms of use of online services (i.e. the fact that service providers may use personal data that they collect about users) and can act prudently in this knowledge Knows that many interactive services use information about him or her to filter in commercial messages in more or less explicit manners		

	<p>Can distinguish between data protection and data security</p> <p>Knows about appropriate behaviour in the digital domain</p> <p>Understands how his/her own digital footprint can be seen by others</p> <p>Knows how data about his/her digital identity can or cannot be used by third parties</p> <p>Understands the risk of identity theft and other credentials' thefts</p> <p>Knows how to protect other people data that apply to his/her own context (as a worker, a parent, a teacher, etc.)</p>
Skills examples	<p>Is able to monitor his/her digital identity and footprints</p> <p>Is able to act prudently regarding privacy issues</p> <p>Is able to track down information about self</p> <p>Can delete or modify information about self or others she/he is responsible for</p>
Attitude examples	<p>Is aware of online privacy principles of self and of others</p> <p>Is aware of the impact and longevity of digital information that s/he considers for publishing</p> <p>Can exploit the benefits of having multiple identities to fit a number of purposes</p> <p>Acts in a critical way when displaying online information about self</p>

Dimension 5			
Application to purpose			
Learning	I know the types of information that I should not share with others when I am making an application for a course	I understand how my data will be used by the institution I am applying to, and select an appropriate level of security setting when communicating with personnel at the institution	I have asked the institution how my data are retained, and what their policies are on privacy. I check my security settings and systems often, and update my security software, to make sure that breaches are reduced as much as possible
Employment	I know the types of information that I should ask of others when they are requesting to purchase an item	I have an intuitive idea of how data will be held by the company, and select an appropriate level of security setting when communicating with personnel within and outside the company	I know how data is retained in the company, and what its policies are on privacy. I check my security settings and systems often, security software is automatically updated, and I know who to contact if I believe there are possible problems

Dimension 1	Safety		
Name of area			
Dimension 2	4.3 Protecting health		
Competence title and description	To avoid health-risks related with the use of technology in terms of threats to physical and psychological well-being		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I know how to avoid cyber bullying. I know that technology can affect my health, if misused.	I know how to protect myself and others from cyber bullying and I understand the health risks associated with the use of technologies (from ergonomics aspects to addiction to technologies).	I am aware of the correct use of technologies to avoid health problems. I know how to find a good balance between online and off-line worlds.
Dimension 4			
Knowledge examples	<p>Knows the effect of prolonged use of technologies</p> <p>Knows about the addictive aspects of technologies</p>		

Skills examples	Is able to manage the distracting aspects of working/living digitally Is able to take preventive steps to protect his/her own health and the health of other she/he is responsible for		
Attitude examples	Has a balanced attitude towards technological use		
Dimension 5			
Application to purpose			
Learning	I am aware that using technologies can be addictive, for learning as they are for other purposes.	I understand the negative and positive aspects of technology and its uses that relate to learning.	I have read about negative and positive aspects of technology and its uses that relate to learning, and have discussed this issue in an expert forum online.
Employment	I am aware that using technologies can be addictive, when they are used for employment as they are for other purposes.	I understand the negative and positive aspects of technology and its uses that relate to business and my area of employment.	I have read about negative and positive aspects of technology and its uses that relate to my area of employment, and have discussed this issue online with others in related businesses.

Dimension 1	Safety		
Name of area			
Dimension 2	4.4 Protecting the environment		
Competence title and description	To be aware of the impact of ICT on the environment		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I take basic measures to save energy.	I understand the positive and negative aspects of the use of technology on the environment.	I have an informed stance on the impact of technologies on everyday life, online consumption, and the environment.
Dimension 4			
Knowledge examples	Can determine if appropriate and safe digital means are available, that are efficient and cost-effective in comparison with other means Has a comprehensive mental map of how the online world works. Understands the technologies s/he is using at a level that is sufficient to underpin good purchasing decisions, e.g., about devices or Internet service providers Understands the environmental impact of computers and electronic devices and how s/he can make them last longer by recycling parts of it (such as changing hard disks)		
Skills examples	Is able to use digital services without being completely dependent on them (or: helpless without) Knows how to use digital equipment cost-efficiently and also time-efficiently.		
Attitude examples	Has a positive but realistic attitude towards the benefits and risks associated with information technologies Has understood that the digital environment we are facing can make things better or worse - it all depends on how we are using it and what rules we find for it Is aware of environmental issues related to the use of digital technologies.		

Dimension 5			
Application to purpose			
Learning	I do not print out all the articles I should read for an exam, I first read the abstract to see if it is really relevant.	I tend to opt for a technological solution rather than a non-technological one when I see that the digital choice has less impact on the planet.	I would not buy a new device for learning (example: laptop, ebook reader) only for reasons of peer-pressure if my old ones are still good for the purpose.
Employment	I switch off my computer when I leave the office.	I understand that my needs to have new devices for work can have an impact on the environment.	I research the best available technological devices and software before asking for my work equipment to be changed.

5.3 Area 5: Problem solving

General description:

Identify digital needs and resources, make informed decisions on most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update own and other's competence.

Competences:

- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Innovating and creatively using technology
- 5.4 Identifying digital competence gaps

Dimension 1	Problem solving		
Name of area			
Dimension 2	5.1 Solving technical problems		
Competence title and description	To identify possible technical problems and solve them (from trouble-shooting to solving more complex problems).		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I can ask for targeted support and assistance when technologies do not work or when using a new device, programme or application.	I can solve easy problems that arise when technologies do not work.	I can solve a wide-range of problems that arise from the use of technology.
Dimension 4			
Knowledge examples	Knows how a computer or digital device is built Knows where to look for solving a problem Knows sources of information and where to find help for problem-solving and trouble shooting. Knows where to find the relevant knowledge for the solution of technical and theoretical problems		
Skills examples	Uses a widely diverse and well-balanced mix of digital and non-digital technologies for different problems and will dynamically change options over time Is able to solve a technical problem or to decide what to do when technology does not function		
Attitude examples	Take an active approach to solving problems Is willing to seek advice when a problem arises Can think of alternatives when problems cannot be solved and things have to be done		

Dimension 5			
Application to purpose			
Learning	If something does not work, I know how to explain the problem to the helpline.	When problems arise, I can usually tackle about half of them, either from previous experience or by contacting the helpdesk.	Not many problems arise that I can't solve, but I still need to contact the helpdesk when the software is new to me.
Employment	If something does not work, I know there is a company helpline and service desk to contact and I am able to explain the problem.	When problems arise, I can usually tackle about half of them, either from previous experience or by contacting the company helpdesk.	Not many problems arise that I can't solve, but I still need to contact the company helpdesk when the software is new to me.

Dimension 1	Problem solving								
Name of area									
Dimension 2	5.2 Identifying needs and technological responses								
Competence title and description	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								
Dimension 3	<table border="1"> <thead> <tr> <th>A - Foundation</th> <th>B- Intermediate</th> <th>C- Advanced</th> </tr> </thead> <tbody> <tr> <td>I can use some technologies to solve problems, but for limited tasks. I can make decisions when choosing a digital tool for a routine practice.</td> <td>I understand what technology can do for me and what it cannot. I can solve a non routine tasks by exploring technological possibilities. I can select appropriate tool according to the purpose and I can evaluate the effectiveness of the tool.</td> <td>I can make informed decisions when choosing a tool, device, application, software or service for the task I am not familiar with. I am aware of new technological developments. I understand how new tools work and operate. I can critically evaluate which tool serves my purposes the best.</td> </tr> </tbody> </table>			A - Foundation	B- Intermediate	C- Advanced	I can use some technologies to solve problems, but for limited tasks. I can make decisions when choosing a digital tool for a routine practice.	I understand what technology can do for me and what it cannot. I can solve a non routine tasks by exploring technological possibilities. I can select appropriate tool according to the purpose and I can evaluate the effectiveness of the tool.	I can make informed decisions when choosing a tool, device, application, software or service for the task I am not familiar with. I am aware of new technological developments. I understand how new tools work and operate. I can critically evaluate which tool serves my purposes the best.
A - Foundation	B- Intermediate	C- Advanced							
I can use some technologies to solve problems, but for limited tasks. I can make decisions when choosing a digital tool for a routine practice.	I understand what technology can do for me and what it cannot. I can solve a non routine tasks by exploring technological possibilities. I can select appropriate tool according to the purpose and I can evaluate the effectiveness of the tool.	I can make informed decisions when choosing a tool, device, application, software or service for the task I am not familiar with. I am aware of new technological developments. I understand how new tools work and operate. I can critically evaluate which tool serves my purposes the best.							
Proficiency levels									
Dimension 4									
Knowledge examples	<p>Understands the potential and limitations of digital devices and resources</p> <p>Knows the range of things that can be done using technologies.</p> <p>Is aware of the most relevant or popular digital technologies used by others (e.g. peers, reputed experts).</p> <p>Has reasonable knowledge of available technologies, their strengths and weaknesses and whether and how they might support the achievement of personal goals</p>								
Skills examples	<p>Is able to make informed decisions (with human or technological assistance where appropriate) about whether and how to use technologies to pursue personally relevant goals.</p> <p>Can choose the most appropriate technologies according to the problem.</p>								
Attitude examples	<p>Awareness of the value of traditional tools in conjunction with networked media.</p> <p>Is interested in new technologies.</p> <p>Critically evaluates possible solutions using digital tool.</p>								
Dimension 5									
Application to purpose									
Learning	I use online learning environments for routine tasks, but when I face a new or ill-defined problem, I have to ask for help.	For a school assignment, I can use several approaches or technologies, but I need to take several steps to explore what serves me best.	I can plan, monitor and critically evaluate which of many tools will best serve my study needs (which online resources, software, technology).						
Employment	I use online resources for	When I face a task I am not	At work, I select and order						

	solving certain (routine) tasks.	familiar with or if the task is not very well defined, I can explore different possibilities (tools, technologies) and make a decision about which is the most effective.	the technology and tools that are most appropriate for my business needs. I am able to select from several products the one which will serve my needs best. I can plan and monitor the steps taken.
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Dimension 1	Problem solving		
Name of area			
Dimension 2	5.3 Innovating and creatively using technology		
Competence title and description	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		
Dimension 3	A - Foundation	B- Intermediate	C- Advanced
Proficiency levels	I know that technologies and digital tools can be used for creative purposes and I can make some creative use of technologies.	I can use technologies for creative outputs and I can use technologies to solve problems (i.e. visualizing a problem). I collaborate with others in the creation of innovative and creative outputs, but I don't take the initiative.	I can solve conceptual problems taking advantage of technologies and digital tools, I can contribute to the knowledge creation through technological means, I can take part in innovative actions through the use of technologies. I proactively collaborate with others to produce creative and innovative outputs.
Dimension 4			
Knowledge examples	<p>Uses a widely diverse and well-balanced mix of digital and non-digital technologies for different problems and will dynamically change options over time</p> <p>Can solve a theoretical problem, of individual or collective interest, through or with the support of digital tools</p> <p>Knows how to find the relevant knowledge for the solution of theoretical problems</p> <p>Understands how meaning is produced through multimedia and technologies</p>		
Skills examples	<p>Knows how to explore the web, the market, or his/her online network when searching for solutions</p> <p>Is capable of exploiting technological potentials in order to represent and solve problems</p> <p>Knows how to solve problems individually and collectively (peer-problem solving)</p> <p>Is able to build meaningful knowledge through interaction with digitally available resources</p> <p>Is able to use a variety of media to express oneself creatively (text, images, audio, and movie)</p>		
Attitude examples	<p>Is willing to explore alternative solutions that are offered by technologies</p> <p>Is pro-active in looking for solutions</p> <p>Is pro-active in collaborative problem solving</p> <p>Is open to revise his/her values and attitudes according to the situation</p> <p>Sees the potential of technologies and media for self-expression and knowledge creation</p> <p>Values the added value of new media for cognitive and creative processes</p> <p>Is critical about knowledge production and consumption with media and technologies</p>		
Dimension 5			
Application to purpose			
Learning	I can use my smart phone for taking pictures for the school project and I propose a creative artifact despite using basic digital means.	I can use the appropriate digital tools to enhance my school assignments and to better understand and represent a conceptual	I use several tools for representing concepts when I structure my assignment. I create wikis to collaborate with school mates on the

Employment	I can use simple software provided in my company in ways that were not necessarily those that the software was created for.	problem (e.g. mind mapping). I can use project management software to plan, organize, and manage resource pools. I can use software and applications that help me visualize or organize a complex task and therefore see it in a different way.	assignment. I can think of several original technological-based initiatives I know that technologies can help me understand better how to organize staff, resources, financial issues and actions in my team and I use a variety of specialized software to help me predict the future needs of my project and team.

Dimension 1	Problem solving								
Name of area									
Dimension 2	5.4 Identification of digital competence gaps								
Competence title and description	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.								
Dimension 3	<table border="1"> <thead> <tr> <th>A - Foundation</th> <th>B- Intermediate</th> <th>C- Advanced</th> </tr> </thead> <tbody> <tr> <td>I have some basic knowledge, but I am aware of my limits when using technologies.</td> <td>I know how to learn to do something new with technologies.</td> <td>I frequently update my digital competence needs.</td> </tr> </tbody> </table>			A - Foundation	B- Intermediate	C- Advanced	I have some basic knowledge, but I am aware of my limits when using technologies.	I know how to learn to do something new with technologies.	I frequently update my digital competence needs.
A - Foundation	B- Intermediate	C- Advanced							
I have some basic knowledge, but I am aware of my limits when using technologies.	I know how to learn to do something new with technologies.	I frequently update my digital competence needs.							
Proficiency levels									
Dimension 4									
Knowledge examples	<p>Understands the wider context of digital tools in a 'digital age' characterised by globalisation and networks</p> <p>Understands where ICT comes from, who develops it and for what purposes.</p> <p>Has first-hand knowledge and expertise of the major digital technologies used in his/her field.</p>								
Skills examples	<p>Possesses the skills to update knowledge about the availability of digital tools.</p> <p>Is able to stay informed using a combination of active search and personalised, automated delivery of information</p> <p>Knows how to self-regulate his/her learning about digital technologies.</p> <p>Can self-monitor personal goals and can diagnose deficiencies of digital competence required for reaching these goals. Can support others in monitoring and diagnosing.</p> <p>Is able to learn and integrate the new technologies that emerge.</p> <p>Is able to learn how to work with any new digital technology by trying it out, and using its internal guidance and help.</p> <p>Is able to adapt smoothly to new technology and to integrate technology into his/her environment</p> <p>Can transfer knowledge</p> <p>Includes more and more digital instruments in everyday life to increase the quality of life</p>								
Attitude examples	<p>Has a general level of confidence, meaning that s/he is willing to experiment with new technologies, but also to reject inappropriate technologies</p> <p>Reflect own digital skills and development (the ability to be aware of oneself as a digitally literate person and to reflect on one's own digital literacy development)</p> <p>Holds a positive attitude to learn about emerging digital technologies</p> <p>Is able to broaden/update digital competences according to personal/professional needs</p> <p>Is aware of the general trends within new media even if s/he does not use them</p>								
Dimension 5									
Application to purpose									
Learning	I know of ways that other people use technologies to support their learning that I	I know there are courses that I can attend online that will instruct me about certain	I look for a good online course to attend every six months or so to help me						

Employment	<p>don't use.</p> <p>I know of ways that other people in the company use technologies to support their work that I don't use.</p>	<p>ways to use the technologies to support my learning.</p> <p>I know there are courses that I can attend online that will instruct me about certain ways to use the technologies to support my work.</p>	<p>with my use of technologies for learning.</p> <p>I am expected to attend a good online course at least once a year to help me with my use of technologies for my work.</p>
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Annex I: Glossary

There are some basic terms that are used in this report that are based on currently endorsed definitions. The DIGCOMP project aims to support framework and guidelines development, as such the European Qualifications Framework – EQF – has been used as a reference for several aspects, including the definition of some basic terms (European Parliament and the Council, 2008).

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

'Skills' 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.

Competence

There are two slightly different definitions of 'competence' in the recent European policy recommendations. 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 European Qualifications Framework recommendation, 'competence' is seen as the most advanced element of the framework descriptors and is defined as the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. Furthermore, in the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy (European Parliament and the Council, 2008).

In the context of this work, competence is understood as a set of knowledge, attitudes and skills.

Dimensions

The concept of "dimension", as used in this work, has been borrowed from the eCompetence framework for ICT professionals.¹⁰ 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. In this report, 5 dimensions have been identified: dimension 1 refers to the areas of digital competence, dimension 2 to the competences that belong to each area, dimension 3 to the levels that are foreseen for each competence, dimension 4 to the examples per each competence of the relevant knowledge, skills and attitudes that are needed, and finally, dimension 5 to the purpose (or context) where each specific competence can be applied.

Purpose

In this work, purpose refers to the context of applicability of each competence. Digital technologies are more and more used in domains (at work, school, home) and with different finalities (entertainment, social life, work, learning). Therefore, the purposes depicted here show how the specific competence can be applied to that specific context. In other words, they translate the general competence description into a more real-life example. The purposes that have been

¹⁰ See: <http://www.ecompetences.eu/>

identified are: Leisure; Social; Buying and Selling; Learning; Employment; Citizenship; Well-being. Only Learning and Employment are included as descriptions in this report. Purposes can be so defined:

- *Leisure*: use of technologies for entertainment or personal issues (examples include: looking for flights for holidays, gaming, reading ebooks, watching web-streamed videos, listening to music through digital tools);
- *Social*: interact with friends and peers with digital tools (examples include: sending emails or SMS, participating to social networking sites, linking with others through online communities);
- *Buying and Selling*: using online resources to buy and sell goods, ecommerce, online consumerism (examples include: buying a flight or train ticket online, buying applications and software, buying and selling virtual goods such as items to be used in virtual worlds in video-game environments, taking part in consumer-to-consumer services);
- *Learning*: using technologies for life-long learning (examples include: using reference software when writing a university assignment, using the web to browse for information, using specialised subscriptions to access scientific articles, using online communities as a network for the exchange of knowledge);
- *Employment*: using technologies to perform different types of work (examples include: using software to register orders of clients in a bar and to calculate the bill, using spreadsheet to calculate budget, understanding wireless settings of mechanic machines);
- *Citizenship*: using technologies to use services and to take active part in civic life (examples include: online banking, eGovernment, eCommerce)
- *Well-being*: using technologies for health-related purposes (examples include: taking appointments with the doctor, checking online information for health related issues, using a track system log data about sport activities).

Annex II: Cross-references between Competences

Competence areas Dimension 1	Competences Dimension 2	Cross-references
1. Information	1.1 Browsing, searching, & filtering information	2.1, 2.2
	1.2 Evaluating Information	
	1.3 Storing and retrieving information	3.3, 2.2, 2.1, 4.1
2. Communication	2.1 Interacting through technologies	
	2.2 Sharing information and content	1.3, 3.3
	2.3 Engaging in online citizenship	
	2.4 Collaborating through digital channels	2.5
	2.5 Netiquette	
	2.6 Managing digital identity	4.2
3. Content creation	3.1 Developing content	1.1, 1.2, 2.1, 2.2
	3.2 Integrating and re-elaborating	1.1, 1.3, 1.4, 3.3, 2.2
	3.3 Copyright and Licences	1.4
	3.4 Producing multimedia and creative outputs	2.1, 2.2, 2.4, 2.5
	3.5 Programming	5.1
4. Safety	4.1 Protecting devices	1.1, 5.1
	4.2 Protecting data and digital identity	1.1, 2.6
	4.3 Protecting health	2.1, 2.5
	4.4 Protecting the environment	5.3
5. Problem solving	5.1 Solving technical problems	5.4
	5.2 Identifying needs and technological responses	1.1, 1.2, 1.3
	5.3 Innovating and creatively using technology	4.4, 5.4
	5.4 Identifying digital competence gaps	Relevant for all aspects of digital competence

Annex IV: Indicators for the development of digital competence

	Getting to A	Moving from A to B	Moving from B to C
Information	<ul style="list-style-type: none"> • Understanding what a search engine is • Finding out how to do searches with simple words • Understanding how to save content and information • Understanding which information is covered by Copyright • Understanding that how to trust online information 	<ul style="list-style-type: none"> • Finding out about and using effective search methods. • Finding out how to judge information and using these strategies. • Finding out how to maintain files and content regularly and implementing practices. • Understanding terms as copyright, copyleft and creative commons. 	<ul style="list-style-type: none"> • Finding out about and trying a wider range of search techniques and strategies. • Finding out about how to cross-check and filter information and using these strategies. • Finding out about and trying a wider range of methods and tools to organise information. • Understanding about different types of licences and how to apply them.
Communication	<ul style="list-style-type: none"> • Finding out about different digital communication channels • Understanding how to use a few communication tools • Becoming aware of basic principles for communicating through digital means • Becoming aware of how to use technologies for cooperating with others 	<ul style="list-style-type: none"> • Finding out about and trying more ways to communicate with others. • Finding out about and regularly using ways to shares files and content with others. • Ensuring that cooperative tools are used as regularly as possible and seeing opportunities when needs arise. • Finding out about online services • Finding out about netiquette 	<ul style="list-style-type: none"> • Finding out and trying a wide range of communication tools and devices. • Finding out about and trying these in the context of their match to needs and purpose. • Finding out about a wide range of information sharing devices and tools, and identifying which of these tools and devices best matches different needs and purposes. • Becoming engaged in civic online participation • Understand cultural differences

	Getting to A	Moving from A to B	Moving from B to C
Content-creation	<ul style="list-style-type: none"> • Finding out about different tools, software and packages to produce content • Understanding how to use some simple tools • Understanding how to modify content 	<ul style="list-style-type: none"> • Finding out about and using different ways that ICT can produce content. • Become familiar with multimedia tools • Understanding how to apply licences to the content one has produced • Finding out about tools that support creating new programmes or applications 	<ul style="list-style-type: none"> • Selecting ways to produce content that are not so familiar and using these in contexts appropriate to needs and purpose. • Finding out about and using ways to edit and refine content. • Finding out about and using expert ways of combining existing content such as mash-up. • Becoming familiar with different types of licences. • Learning how to code and programme.
Safety	<ul style="list-style-type: none"> • Finding out simple means of protections (passwords, anti-viruses, avoid sharing information) • Understanding how to protect self from addiction or cyber bullying 	<ul style="list-style-type: none"> • Finding details of the information that should not be shared online, and having opportunities to put this into practice. • Finding out about and using a range of tools to protect digital devices. • Finding out about the impact of technologies on the environment 	<ul style="list-style-type: none"> • Finding out about and using a wide range of protection strategies and how these apply to online identities. • Knowing how to change online security and privacy settings, and monitoring and adjusting these regularly as needed, checking them against expert practice. • Having access to expert sources that detail the different privacy issues, and how to address these in practice. • Finding out about the impact of technologies on society
Problem-solving	<ul style="list-style-type: none"> • Finding out who to ask in case something does not work or cannot be done • Understanding how different technologies can help solve everyday problems 	<ul style="list-style-type: none"> • Having access to sources or centres that demonstrate digital technologies, and having chance to explore their use according to personal needs. • Having access to sources or centres that offer technical advice, and enable the individual to gain personal experience in solving technical problems. • Creating own network of experts to recur to for help 	<ul style="list-style-type: none"> • Having access to a range of expert advice relating to new tools, devices, applications, software and services, to provide opportunities to review these in terms of current or future personal needs and purpose. • Having access to expert technical advice that demonstrates how to solve technical problems that arise, and being able to use this in practice. • Having access to a means to check personal competence, and being directed to sources to update competence areas that are identified as weak. • Finding out about the potential of technologies in the resolution of complex or cognitive problems

Annex V: Relevance of Digital Competence for other Key Competences for Lifelong learning

Digital Competence is one of the eight Key Competences for Lifelong Learning. The other seven are: Communication in the mother tongue; Communication in foreign languages; Mathematical competence and basic competences in science and technology; Learning to learn; Social and civic competences; Entrepreneurship; and Cultural awareness and expression.

As highlighted in the 2006 recommendations of the European Parliament and the Council (2006), many of the key competences are overlapped and interlocked. We therefore here propose our own mapping of the relevance of Digital Competence for other key competences, with references to the more relevant specific competences provided in the framework (C stands for Competence, for instance: C 1.1 is Competence 1.1 Browsing, searching & filtering information). The examples in the bullet points are verbatim taken from the examples in the Recommendations of 2006.

- **Communication in the mother tongue**

- Ability to express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form
C 2.1, 2.3, 2.4, 2.5
- Formulate and express one's oral and written arguments in a convincing way appropriate to the context.
C 3.1, 3.2, 3.3, 3.4
- Abilities to distinguish and use different types of texts, to search for, collect and process information
C 1.1, 1.2, 1.3
- Need to understand and use language in a positive and socially responsible manner
C 2.5

- **Communication in foreign languages**

Regarding this competence, digital means are relevant when applied to a foreign language (for instance, when accessing websites in foreign languages)

- Ability to express and the ability to understand spoken messages, to initiate, sustain and conclude conversations
C 2.1, 2.3, 2.4, 2.5
- Knowledge of societal conventions, and the cultural aspect and variability of languages.
C 2.5
- Learn languages also informally as part of lifelong learning.
C 2.3, 2.4
- To read, understand and produce texts appropriate to the individual's needs.
C 1.1, 1.3, 3.1, 3.2, 3.4

- **Mathematical competence and basic competences in science and technology**

- Ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situations.
C 5.2, 3.5
- Use mathematical modes of thought (logical and spatial thinking) and presentation (formulas, models, constructs, graphs, charts).
C 3.1
- Understanding of the impact of science and technology on the natural world.

C 4.4

- Limitations and risks of scientific theories, applications and technology in societies at large (in relation to decision-making, values, moral questions, culture, etc.).
C 4.4, 2.5, 2.6, 3.3, 4.2
- Ability to use and handle technological tools and machines.
C 1.1, 1.4, 2.1, 2.2, 3.1, 3.2, 3.4, 3.5, 4.1, 4.2, 5.1, 5.3
- To recognise the essential features of scientific inquiry and have the ability to communicate the conclusions and reasoning that led to them.
C 2.1, 2.2
- An interest in ethical issues and respect for both safety and sustainability, in particular as regards scientific and technological progress in relation to oneself, family, community and global issues.
C 2.5, 4.2, 4.3, 4.4
- **Learning to learn**
- Effective management of time and information.
C 1.1, 1.2, 1.3, 1.4
- Awareness of one's learning process and needs, identifying available opportunities.
C 5.4, 5.3
- Ability to overcome obstacles in order to learn successfully.
C 5.2, 5.4
- **Social and civic competences**
- Personal and social well-being which requires an understanding of how individuals can ensure optimum physical and mental health.
C 2.5, 4.3
- To understand the codes of conduct and manners generally accepted in different societies and environments.
C 2.5, 2.4, 2.6, 4.2
- To fully participate in civic life.
C 2.3
- **Entrepreneurship**
- The ability to plan and manage projects in order to achieve objectives.
C 2.3
- The ability to work both as an individual and collaboratively in teams.
C 2.4
- The ability to judge and identify one's strengths and weaknesses.
C 5.4
- **Cultural awareness and expression**
- Appreciation of the importance of the creative expression of ideas, experiences and emotions in a range of media
C 3.4
- understanding of one's own culture and a sense of identity
C 2.3, 2.6

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Abstract

This is the final report of the DIGCOMP study. It presents a detailed framework for the development of digital competence of all citizens. The framework is the output of a wide stakeholder consultation. It consists of detailed descriptions of all competences that are necessary to be proficient in digital environments and describes them in terms of knowledge, skills, and attitudes. Three proficiency levels are suggested for each competence. The report provides as well a self-assessment grid for mapping digital competence levels.

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Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.



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