

Table 1 Definitions of Digital Skills

Reference	Digital skills definition	Assessment
OECD (2004) ²⁴	The definition used by the OECD focuses on three categories of ICT competencies linked to three different types of users: • ICT specialists: competencies under this user group cover the ability to develop, operate and maintain ICT systems. ICTs constitute the main part of their job for this user group; • Advanced users: this group of users are described as '<i>competent users of advanced, and often sector-specific, software tools</i>'. ICTs are used as a tool for these users in a workplace context; and • Basic users: this group of users are described as '<i>competent users of generic tools (e.g. office suites and internet-related tools such as browser and email clients) needed for the information society, e-government and working life</i>'. ICTs for this user group are mainly used as a communicating tool.	One of the few digital skills definitions that recognises the different types of digital users.
e-skills Forum (2004)	In 2004, the e-skills Forum²⁵ proposed a definition of e-skills. This was later adopted in the e-skills Communication in 2007.²⁶ The definition included the following three categories: • ICT user skills: skills linked to the ability to make effective use of ICT systems and devices; • ICT practitioner skills: skills linked to researching, developing, designing, strategic planning, managing, producing, consulting, integrating, installing, administering, maintaining, supporting and servicing ICT systems; and • E-business skills: skills needed to exploit opportunities provided by ICT and the internet to ensure a more effective and efficient performance of different types of organisations.	The concepts used under the three categories proposed by the e-skills Forum are not clearly defined, and the boundaries are blurred.

²⁴ OECD 2013. *Skills for the Digital Economy*. OECD. Published May. Available: <http://skills.oecd.org/developskills/documents/skillsforthedigitaleconomy.html>. [Accessed May 3 2014], OECD 2005. *NEW PERSPECTIVES ON ICT SKILLS AND EMPLOYMENT* OECD. Published April 22. Available: <http://www.oecd.org/internet/ieconomy/34769393.pdf>. [Accessed June 1 2012].

²⁵ COMMISSION 2014. *e-Skills for the 21st Century Fostering Competitiveness, Growth and Jobs*. European Commission. Published October 27. Available: http://ec.europa.eu/enterprise/sectors/ict/e-skills/index_en.htm. [Accessed March 2 2015].

²⁶ COMMISSION 2007. *e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs*. European Commission. Published September 7. Available: http://ec.europa.eu/enterprise/sectors/ict/files/comm_pdf_com_2007_0496_f_en_acte_en.pdf. [Accessed February 3 2010].

Reference	Digital skills definition	Assessment
DigEuLit project (Martin 2005²⁷)	The term digital literacy used in the DigEuLit project covers: • Digital competence: defined as the knowledge, understanding, attitudes and skills relating to the digital world; • Digital usage: defined as the application of digital competence within specific professional or domain contexts; and • Digital transformation: defined as the use of digital technologies to enable innovation and creativity, and stimulate significant change within the professional or knowledge domain.	The DigEuLit definitions are broad, but efforts have been made to differentiate between 'user types'.
European Parliament (2006²⁸)	The European Parliament defines digital competence as <i>"the confident and critical use of information society technology for work, leisure, learning and communication. It is underpinned by basic skills in ICT, i.e. the use of computers to retrieve, access, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the internet"</i> .	The European Parliament definition is broad; it does not take into account digital competences that are likely to be needed in a work context.
Ala-Mutka (2011²⁹)	The IPTS report '<i>Mapping Digital Competence: Towards a Conceptual Understanding</i>' uses the following five concepts: 1. 'Computer literacy' or 'technology literacy': the ability to use computers and related software; 2. Internet (or network) literacy: skills needed to locate, select and evaluate information on the internet; 3. Information literacy: skills needed to locate and evaluate information, store and retrieve information, make effective and ethical use of information and apply information to create and communicate knowledge; 4. Media literacy: skills that enable people to analyse, evaluate, and create messages in a wide variety of media modes, genres, and formats; and 5. Digital literacy: the most overarching concept, which includes many of the skills discussed in the concepts mentioned above. These concepts informed the development of the DIGICOMP framework.	The skills and knowledge across the five concepts developed include several inter-related areas.

²⁷ MARTIN, A. 2005. *DigEuLit - a European Framework for Digital Literacy: a Progress Report*. University of Glasgow. Available: http://www.jelit.org/65/01/JeLit_Paper_31.pdf. [Accessed October 3 2010].

²⁸ http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Digital_literacy

²⁹ ALA-MUTKA, K. 2011. *Mapping Digital Competence: Towards a Conceptual Understanding*. Institute for Prospective Technological Studies. Published October. Available: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=4699>. [Accessed October 30 2011].

Reference	Digital skills definition	Assessment
Ilomäki (2011³⁰)	Ilomäki (2011) links digital competence to basic skills and describes it as the ability to “ <i>retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the internet</i> ”.	The definition mainly covers users’ basic digital literacy skills.
WDM Consultants (2011³¹)	The Canadian study “ <i>Defining Essential Digital Skills in the Canadian Workplace</i> ” defines digital skills as a multifaceted concept, which encapsulates four skill clusters: (1) Digital Technical Skills; (2) Digital Information Processing Skills; (3) Foundational Skills; and (4) Transversal Skills.	The framework developed under this study is comprehensive, work has been done to separate the different competencies needed for each skill cluster (see Annex for the full framework).
Development Economics (2013³²)	In Development Economics ‘<i>The Future Digital Skills needs of the UK Economy</i>’ report, digital skills are defined ‘<i>as the attributes that allow individuals and businesses both to use digital equipment and to access, create or share digital information via the internet and thereby benefit from opportunities in the modern economy</i>’. The report sets out what it calls ‘<i>a functional hierarchy of these digital skills</i>’ as: • “Advanced digital skills: skills linked to ‘<i>the creation and/or strategic exploitation of new digital applications, including more advanced programming and coding involved in the creation of new software, etc., but they also cover the strategic business skills needed to convert ideas into successful commercial projects and ventures</i>’; • Intermediate-level digital skills: these involve ‘<i>skills needed to implement and manage on a day- to-day basis the applications developed by those with advanced skills, but they may also provide contributions to the development of digital content, provision of system support and maintenance, etc.</i>’; • Entry-level digital skills: skills related to ‘<i>the use of digital applications designed, developed and promoted by others: involving for example searches for and/or the capturing and recording of digital data across a wide variety of business and public services, the administration of databases, the monitoring of data, contributing to the management of digital content, etc.</i>’.	One of the few definitions which recognises the different ‘types’ of digital users.

³⁰ ILOMÄKI, L., KANTOSALO, A. & LAKKALA, M. 2011. *What is digital competence?* European Schoolsnet. Published March. Available: http://linked.eun.org/c/document_library/get_file?p_l_id=16319&folderId=22089&name=DLFE-711.pdf. [Accessed January 3 2012].

³¹ CHINIEN, C. & BOUTIN, F. 2011. *Defining Essential Digital Skills in the Canadian Workplace: Final Report*. Human Resources and Skills Development Canada. Available: http://www.nald.ca/library/research/digi_es_can_workplace/digi_es_can_workplace.pdf. [Accessed June 5 2014].

³² DE 2013. *The Future Digital Skills needs of the UK Economy*. Development Economics. Published September. Available: <http://cdn.news.o2.co.uk.s3.amazonaws.com/wp-content/uploads/2013/09/The-Future-Digital-Skills-Needs-of-the-UK-Economy1.pdf>. [Accessed April 3 2014].

Reference	Digital skills definition	Assessment
Ferrari (2013³³)	Ferrari (2013) refers to digital skills as “ <i>the ability to critically analyse and assess digital information, problem solving through the use of digital tools, creation and recreation of content and so forth</i> ”.	The distinction between skills needed at the lower end of the digital scale, and those needed in the workplace are blurred.
OECD (2013³⁴), PIAAC Survey	OECD in its adult learning survey includes ‘ <i>problem solving in technology-rich environments</i> ’ as one of the necessary skills needed ‘ <i>in a broad range of contexts, from education through work to everyday life</i> ’. This is defined as ‘ <i>the ability to use technology to solve problems and accomplish complex tasks</i> ’. These are skills that are ‘ <i>essential for people to be able to decide what information they need, to evaluate it critically, and to use it to solve problems</i> ’.	OECD focus is on basic digital literacy skills.
DIGCOMP’s Framework for Developing and Understanding Digital Competence in Europe (2013³⁵)	DIGICOMP’s digital framework is based on five dimensions (information, communication, content creation, safety and problem solving) which are sub-divided into a set of competences. These competencies are linked to three proficiency levels; foundation, intermediary and advanced level. The framework sets out a range of skills and knowledge needed for each of these proficiency levels.	A comprehensive but complex framework, not all citizens, learners or users will be interested in developing all the competences listed in the framework (see Annex for a detailed framework).
European e-Competence Framework (e-CF) (European Commission 2014³⁶)	This framework has been mapped against the European Qualifications Framework³⁷. The European e-Competence Framework (ibid) is structured from four dimensions: • “Dimension 1: 5 e-Competence areas, derived from the ICT business processes Plan, Build, Run, Enable and Manage; • Dimension 2: A set of reference e-Competences for each area, with a generic description for each competence. Forty competences identified in total provide the European generic reference definitions of the e-CF 3.0.; • Dimension 3: Proficiency levels of each e-Competence provide European reference level specifications on e-Competence levels e-1 to e-5 that are related to the EQF levels 3 to 8; and	This framework has been designed solely for ICT professionals.

³³ FERRARI, A. 2012. *Digital Competence in practice: An analysis of frameworks*. Institute for Prospective Technological Studies. Published August. Available: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5099>. [Accessed August 17 2012], FERRARI, A. 2013. *DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe*. Institute for Prospective Technological Studies. Published August. Available: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=6359>. [Accessed December 6 2013].

³⁴ <http://www.oecd.org/site/piaac/>

³⁵ FERRARI, A. 2013. *DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe*. Institute for Prospective Technological Studies. Published August. Available: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=6359>. [Accessed December 6 2013].

³⁶ <http://www.ecompetences.eu/>

³⁷ http://relaunch.ecompetences.eu/wp-content/uploads/2013/11/EQF_broch_2008_en.pdf

Reference	Digital skills definition	Assessment
	Dimension 4: <i>Samples of knowledge and skills relate to e-Competences in Dimension 2. They are provided to add value and context and are not intended to be exhaustive”.</i>	
Go ON UK ³⁸	‘Go ON UK’ describes ‘ <i>basic digital skills</i> ’ as ‘ <i>the minimum skills required to safely use the internet and access the benefits it can provide</i> ’. These include ‘ <i>skills needed to benefit from a digital world</i> ’, skills that ‘ <i>allow you to shop, transact, and find the best deals online; communicate with family and friends; access digital public services; and search and apply for jobs</i> ’.	Go ON UK framework focuses on digital literacy skills. However, it is a comprehensive framework, and one of the few that is task focused (see Annex for detailed framework).
UK Digital Skills Taskforce (2014 ³⁹)	The UK Digital Skills Workforce describes digital skills ‘ <i>as the skills needed to interact with digital technologies, and stresses these skills as ‘necessary life skills</i> ’.	The definition mainly focuses on users that need basic digital skills.
(UKforCE) – June 2014 ⁴⁰	A submission from the UK forum for Computing Education (UKforCE), in response to the UK Digital Skills Taskforce call for evidence, uses SOC 2010 occupational groups to estimate which group is likely to have tasks that will require their employees to have a certain level of digital skills. The categories used were: • ‘Digital Muggle: <i>No digital skills required – digital technology may as well be magic;</i> • Digital Citizen: <i>the same work skills as are required to be a full digital citizen. This is the ability to use digital technology purposefully and confidently to communicate, find information and purchase goods/services;</i> • Digital Worker: <i>substantially more digital skills than those required for full digital citizenship but less than those of a Digital Maker. This includes, at the higher end, the ability to evaluate, configure, and use complex digital systems. Elementary programming skills such as scripting are often required for these tasks; and</i> • Digital Maker: <i>skills to actually build digital technology (typically software development). The Digital Maker category is interpreted quite broadly to include, at the low end, for example, workers who regularly create complex Excel macros or data files for controlling 3D printers’.</i>	One of the few definitions that take into account digital skills needed by different types of digital users; basic, intermediate and advanced.

³⁸ <http://www.go-on.co.uk/>

³⁹ UKDS 2014. *Digital Skills for Tomorrow's World: The independent report of the UK Digital Skills Taskforce*. UK Digital Skills Task Force. Published July. Available: <http://www.ukdigitalskills.com/wp-content/uploads/2014/07/Binder-9-reduced.pdf>. [Accessed June 22 2015], UKDS 2015. *Digital Skills for Tomorrow's World*. UK Digital Skills Task Force. Available: <http://www.ukdigitalskills.com/>. [Accessed June 22 2015].

⁴⁰ UKFORCE 2014. *Digital Skills Taskforce call for evidence: Submission from the UK forum for Computing Education (UKforCE)*. UK forum for Computing Education. Available: <http://ukforce.org.uk/wp-content/uploads/2014/06/Digital-Skills-Taskforce-UKforCE-submission-Updated.pdf>. [Accessed July 25 2015].

The above definitions highlight that ‘digital skills’ involves several inter-related skills concepts. While the definitions above are insightful, there are limitations when reviewed in the context of addressing digital skills gaps. In most cases, with the exception of the OECD, Development Economics and UKforCE definitions, no clear distinctions are made between the skills needed by different user groups. Other definitions are either too broad; not all citizens, learners or users will be interested in developing the competences described in some of these frameworks, or narrow; and focus on one user group. However, existing definitions and frameworks taken as a whole all cover the following broad categories:

1. Basic digital literacy skills (Empowering individuals): skills needed by every citizen to become ‘digitally literate’. These are the skills needed to carry out basic functions such as using digital applications to communicate and carry out basic internet searches. Cyber security sits under this category.
2. Digital skills for the general workforce (Upskilling for the Digital Economy): all of category 1, plus skills needed in a workplace and generally linked to the use of applications developed by IT specialists. As discussed in the Development Economics report, equipping the workforce with such skills ‘encourage deeper and faster usage of digital technologies by UK businesses and other organisations and measures’.⁴¹ While the digital skills needed by the workforce are likely to differ across sectors, there will be some minimum requirements linked to processing information that will be applicable across all sectors.
3. Digital skills for ICT professions (Digitally innovative and creative individuals, organisations and businesses): all of categories 1 and 2, plus skills needed to work across the diverse IT sector. They include digital skills linked to the development of new digital technologies, and new products and services. Such skills are needed if the UK is to compare favourably with other nations in relation to ICT investment and utilisation.

Categorising digital skills under these three areas is a useful starting point when discussing the extent to which the supply of digital skills meets the demand for such skills in the economy. To develop appropriate solutions that improve the quantity and the quality of the supply of digital skills in the UK economy, training routes, for example, will need to be developed to cover the skills needed by the above three groups. This requires therefore a re-think of how digital skills are defined. The use of the above three distinct definitions of digital skills is a useful context in which to start discussions around the training needs of different user groups.

⁴¹ DE 2013. *The Future Digital Skills needs of the UK Economy*. Development Economics. Published September. Available: <http://cdn.news.o2.co.uk.s3.amazonaws.com/wp-content/uploads/2013/09/The-Future-Digital-Skills-Needs-of-the-UK-Economy1.pdf>. [Accessed April 3 2014].