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Capacity2Transform

DGC Competence measurement toolkit

Deliverable D1.2.2

Version 1

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Executive summary

Our research involved a thorough bibliometric analysis and literature review focusing on the measurement of digital, green, and entrepreneurial skills. Despite the wealth of existing literature, we identified a critical gap: no preexisting tools adequately measure these skills in the manner required for our project's objectives. Consequently, we developed a tailored questionnaire drawing from the DigiComp, GreenComp, and EntreComp frameworks. This questionnaire will serve as a crucial instrument within the C2T project, facilitating comprehensive assessments of participants' competences.

In addition to questionnaire development, we proposed a monitoring and evaluation plan to track the efficacy of upskilling actions. This plan delineates when and how self-assessments will be conducted and specifies the individuals responsible for monitoring and oversight. By adhering to this plan, we aim to ensure that the objectives of each upskilling action are met and that participants' skill development is effectively measured and documented.

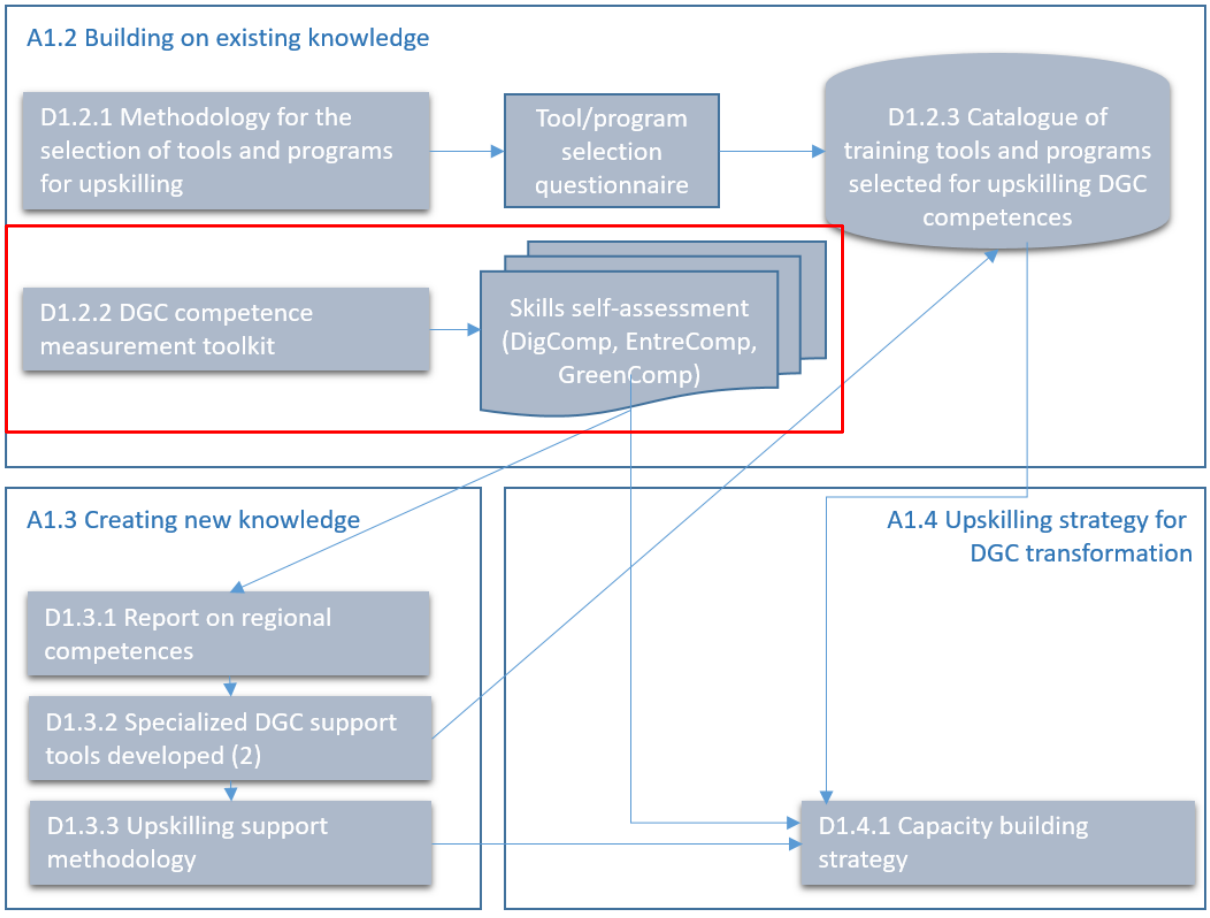
Furthermore, our toolkit includes responsibilities for preparing periodic progress reports. These reports will provide project stakeholders with insights into the progress of upskilling actions and the development of participants' competences. By establishing clear reporting structures and accountability measures, we aim to maintain transparency and facilitate effective communication throughout the project.

1. Introduction

Within Activity 1.2, three deliverables are developed:

- D1.2.1: Methodology for transnational support tool selection and development of upskilling training modules.
- D1.2.2: DGC Competence measurement toolkit.
- D1.2.3: Catalogue of training programs and tools selected for upskilling DGC competences.

DGC Competence measurement toolkit is developed collaboratively by business support and research organizations within the project partnership. It will serve as a guide for measuring the impact of upskilling actions and the overall project. It will contain a self-reflection tool together with design principles describing it. Throughout the project, the toolkit will be continually updated and improved.



2. Bibliometric review

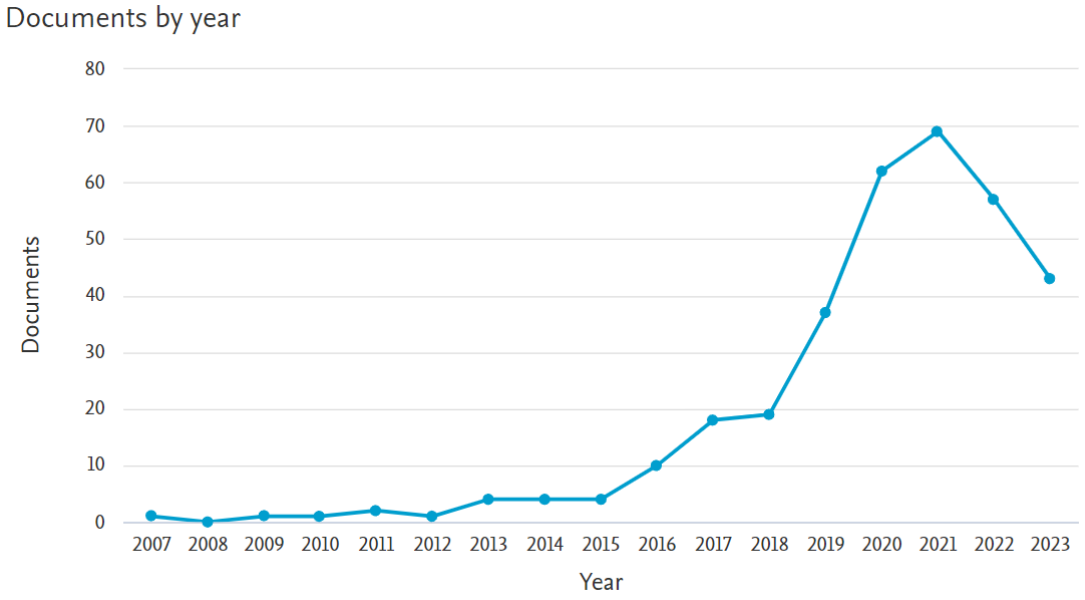
For an overview of the existing body of knowledge on the evaluation of digital, green and entrepreneurial competences, we performed three bibliometric studies, based on Elsevier Scopus database of published scientific outputs in academic journals, books and conference proceedings (www.scopus.com). Scopus is the most comprehensive referencing database of academic research and is more inclusive of social and humanistic science research outputs than its most important competitor (Clarivate Web of Science).

Measurement and evaluation of digital competences

We used the following Scopus advanced query string:

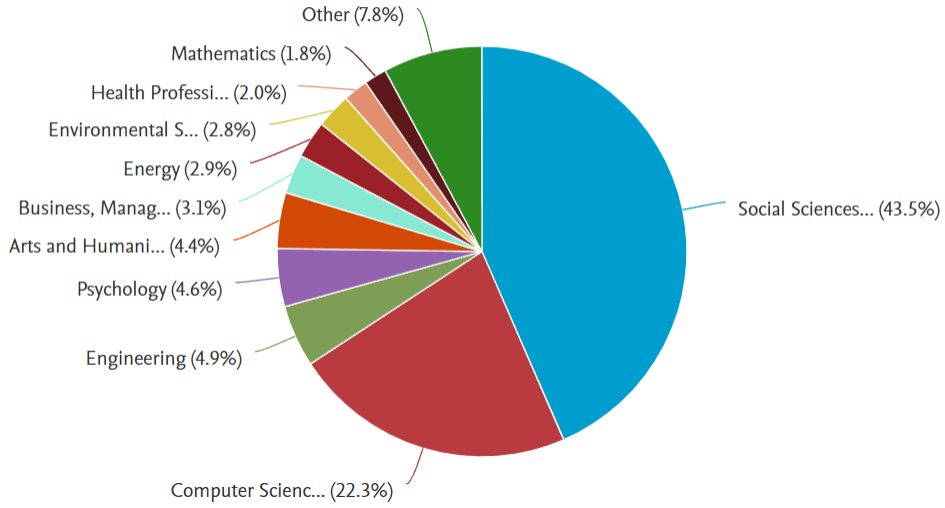
(digital* PRE/3 competen* OR digital* PRE/3 literac* OR digital* PRE/3 skill* OR ICT* PRE/3 competen* OR ICT* PRE/3 literac* OR ICT* PRE/3 skill*) AND (assessment* OR evaluat* OR test* OR measur* OR questionnair* OR stud*) AND (universit* educat* OR academic educat* OR higher educat*)

The search string was selected to produce a balance between the inclusivity of relevant topics, and minimizing the potential number of mismatches, produced by a too broad bibliometric query. This query resulted with a list of 333 scientific outputs, with the preliminary analysis performed by the built-in Elsevier Scopus analytics capabilities. Those show that the peak of researchers' interest for the topic has been reached in 2021 (see the following figure), which coincides with the peak of the Covid pandemic, bringing about restrictions in travel and mobility, lockdowns and dominance of digital tools and the Internet-based communications.



Considered body of literature is multi-disciplinary, with the dominance of social science research topics (43.5%), followed by computer science (22.3%) and engineering (4.9%).

Documents by subject area



Further analysis has been performed by using the advanced Elsevier SciVal tool for bibliometric analysis and reporting. Due to the limits of the SciVal platform, 283 papers, authored in the 2018-2023 period were finally considered for bibliometric analysis.

The research on digital competences is geographically widely dispersed, with the majority of publications produced in the EU countries, especially Spanish academic institutions, followed by China and the US (see the following map).

The top ten countries, according to research productivity and impact in the digital competence field are shown in the following table, including the number of scientific publications (Scholarly Output), and two indicators of scientific impact - the Field-Weighted Citation Index (FWCI) and the absolute number of citations. While the latter is usually considered as a measure of impact, the former (FWCI) is considered to be relevant for complex, multi-disciplinary research, since each discipline has different citation patterns and absolute citation numbers. FWCI takes all those into account and produces a simple measure of international scientific impact: if its value equals 1.0, the impact is average (expected). Values higher than 1.0 imply an above-average impact, while values lower than 1.0 imply a below-average impact (regardless of the entity for which FWCI is computed - a researcher, a research group, or an institution, or an entire country).

Country/Region	Scholarly Output	Field-Weighted Citation Impact	Citation Count
Spain	61	2,1	838
China	20	2,32	155
United States	20	1,68	261
Germany	14	2,62	150
India	12	0,62	41
Netherlands	12	11,55	487
Chile	11	1,81	198
Malaysia	11	0,22	14
Russian Federation	11	1,11	42
Australia	9	0,92	23

Top ten institutions, engaged in this type of research are as follows:

Institution	Country/Region	Scholarly Output	Field-Weighted Citation Impact	Citation Count
Universidad de Salamanca	Spain	12	3,2	224
University of Málaga	Spain	9	3,01	136
Pedagogical University of Cracow	Poland	6	3,79	84
The University of Hong Kong	Hong Kong	6	1,87	56
University of Almeria	Spain	6	1,39	50
University of Twente	Netherlands	6	20,72	362
Central China Normal University	China	5	3,16	61
University of Córdoba	Spain	5	3,52	77
University of Granada	Spain	5	2,06	65
University of Oslo	Norway	5	6,59	337

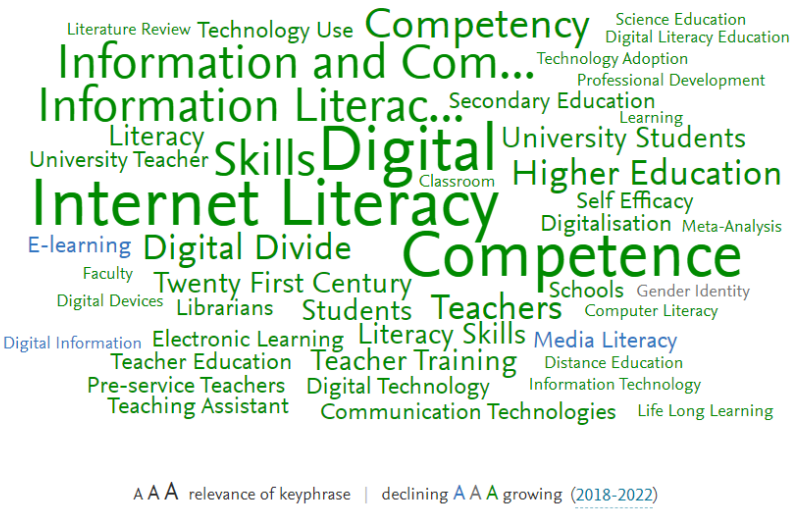
While Spanish institutions produce the highest number of scientific outputs, the University of Twente from the Netherlands is the leading institution, according to the number of citations and the multi-disciplinary (normalized) impact, measured by the FWCI.

The top twenty individual authors, along with the indicators of their productivity and impact, as well as hyperlinks to their Elsevier Scopus author profiles (for further reference) are shown in the following table.

Author	Affiliation	Country/Region	Scholarly Output	Field-Weighted Citation Impact	Cit. Count	Scopus author profile
Guillén-Gámez, Francisco D.	National Distance Education University	Spain	10	2,99	159	https://www.scopus.com/authid/detail.url?authorId=56203574500
Tomczyk, Łukasz	Jagiellonian University in Kraków	Poland	7	3,25	84	https://www.scopus.com/authid/detail.url?authorId=56780136100
Law, Nancy Wai Ying	The University of Hong Kong	Hong Kong	6	1,87	56	https://www.scopus.com/authid/detail.url?authorId=7005934146
Mayorga-Fernández, María José	University of Málaga	Spain	6	2,54	96	https://www.scopus.com/authid/detail.url?authorId=57212883812
de Haan, Jos	The Netherlands	-	5	24,2	337	https://www.scopus.com/authid/

	Institute for Social Research					detail.url?authorId=56110619000
van Deursen, Alexander J.A.M.	University of Twente	Netherlands	5	24,2	337	https://www.scopus.com/authid/detail.url?authorId=23390739300
van Dijk, Jan Amg G.M.	University of Twente	Netherlands	5	24,2	337	https://www.scopus.com/authid/detail.url?authorId=34574250200
van Laar, Ester	University of Twente	Netherlands	5	24,2	337	https://www.scopus.com/authid/detail.url?authorId=57193729346
Chaudhary, Kaylash Chand	University of the South Pacific	Fiji	4	1,99	59	https://www.scopus.com/authid/detail.url?authorId=25927848600
De La Torre, Jimmy	The University of Hong Kong	Hong Kong	4	2,25	54	https://www.scopus.com/authid/detail.url?authorId=22940257400
Reddy, Pritika	Fiji National University	Fiji	4	1,99	59	https://www.scopus.com/authid/detail.url?authorId=8664610800
Ruiz Palmero, Julio	University of Málaga	Spain	4	3,65	63	https://www.scopus.com/authid/detail.url?authorId=56646423600
Sharma, Bibhya Nand	University of the South Pacific	Fiji	4	1,99	59	https://www.scopus.com/authid/detail.url?authorId=55423727000
Wu, Di	Central China Normal University	China	4	3,15	48	https://www.scopus.com/authid/detail.url?authorId=57098420900
Cabero-Almenara, Julio	University of Seville	Spain	3	4,32	51	https://www.scopus.com/authid/detail.url?authorId=23097101400
Economides, Anastasios A.	University of Macedonia	Greece	3	4,9	51	https://www.scopus.com/authid/detail.url?authorId=7004508496
Eger, Ludvík	University of West Bohemia	Czech Republic	3	2,15	51	https://www.scopus.com/authid/detail.url?authorId=36489613600
Esteve-Mon, Francesc M.	Jaume I University	Spain	3	4,3	106	https://www.scopus.com/authid/detail.url?authorId=56486104400
Habók, Anita	University of Szeged	Hungary	3	2,4	9	https://www.scopus.com/authid/detail.url?authorId=55339083200
Makhachashvili, Rusudan K.	Borys Grinchenko Kyiv University	Ukraine	3	0,36	2	https://www.scopus.com/authid/detail.url?authorId=57218565160

Content analysis of the digital competence literature identifies 50 most relevant keyphrases, with their relevance shown by font size, and the relevance in the 2018-2022 period by font color (see following word cloud figure).



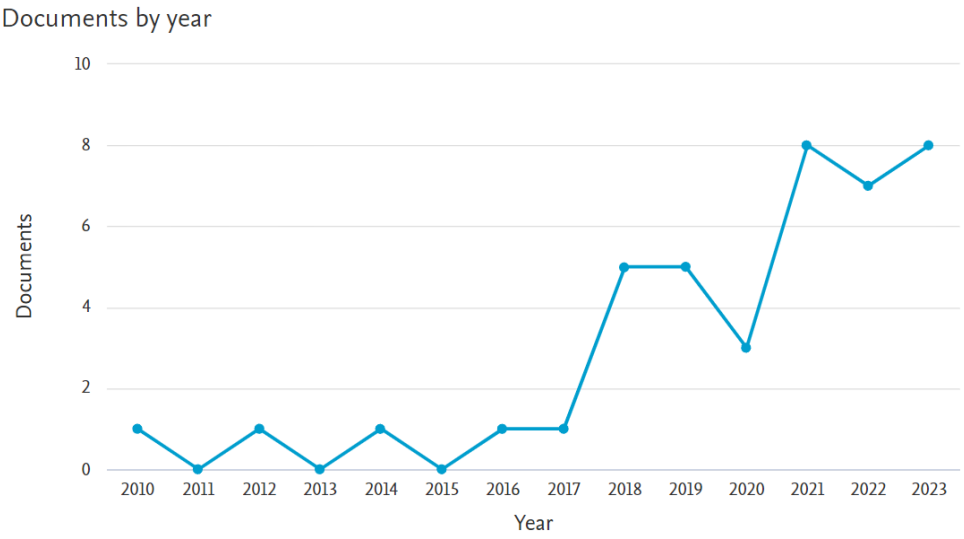
Measurement and evaluation of green competences

We used the following Scopus advanced query string:

(environment* PRE/3 competen* OR environment* PRE/3 literac* OR environment* PRE/3 skill* OR green* PRE/3 competen* OR green* PRE/3 literac* OR green* PRE/3 skill*) AND (assessment* OR evaluat* OR test* OR measur* OR questionnair* OR stud*) AND (universit* educat* OR academic educat* OR higher educat*)

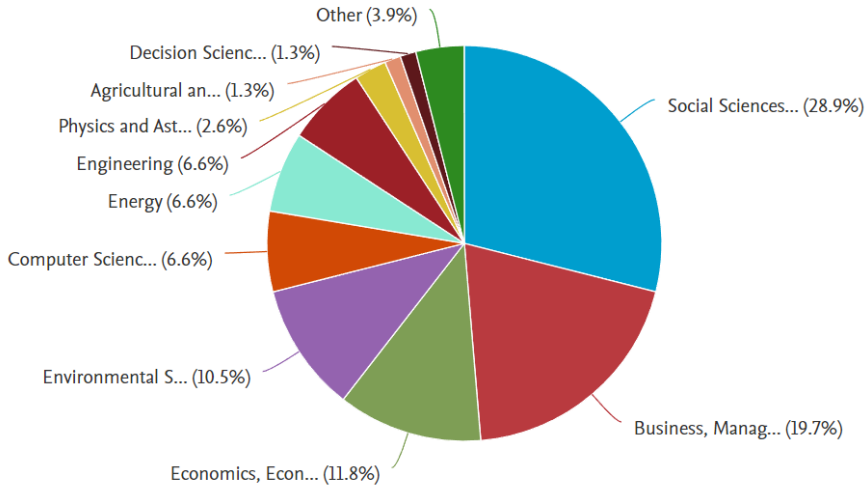
This search has identified only 41 documents, which is logical, as the green competencies and green transformation have come to the forefront of the research and policy interest somewhat later than the digital skills/transformation topics.

The lag between the digital and environmental competence research is evident from the number of scientific publications, available in the Elsevier Scopus reference database for our query (relative to the digital competence query). As demonstrated by the following figure, number of scientific outputs in this field lags until 2017, when the researchers' interest for the environmental (green) competence topics starts developing.



The inter-disciplinary nature of the environmental (green) competence research is shown by the following figure, demonstrating the structure of the analyzed literature, with 28.9% of literature, belonging to the social sciences, 19.7% to the business and management field, 11.8% to economics, 10.5% to environmental sciences, etc.

Documents by subject area



Further analysis has been performed by using the advanced Elsevier SciVal tool for bibliometric analysis and reporting. Due to the limits of the SciVal platform, 35 papers, authored in the 2018-2023 period were finally considered for bibliometric analysis.

Geographical dispersion of environmental (green) competence research is extensive, although most of the relevant research is concentrated in the US, China and the EU countries (see the following map).

The top ten countries, according to the research productivity and impact in the field (using the same indicators, as in the case of digital competences), are shown in the following table. The US is the most productive country, in this field of research, and has the highest research impact, both considering the total number of citations and the multi-disciplinary FWCI indicator.

Country/Region	Scholarly Output	Field-Weighted Citation Impact	Citation Count
United States	8	2,44	58

China	5	1,24	24
Malaysia	5	0,52	32
India	4	0,43	16
United Kingdom	4	0,86	31
Pakistan	3	0,94	15
Saudi Arabia	3	1,05	21
Poland	2	1,44	9
South Africa	2	0,81	6
Spain	2	2,17	44

The top ten institutions, engaged in environmental (green) competence research, are as follows:

Institution	Country/Region	Scholarly Output	Field-Weighted Citation Impact	Citation Count
Massachusetts Institute of Technology	United States	2	0,77	8
Nicolaus Copernicus University in Toruń	Poland	2	1,44	9
Rhodes University	South Africa	2	0,81	6
Suan Sunandha Rajabhat University	Thailand	2	1,13	17
Universiti Teknologi Malaysia	Malaysia	2	0,19	1
Virginia Polytechnic Institute and State University	United States	2	0,77	8
Akdeniz University	Turkey	1	2,34	1
Al Ain University of Science and Technology	United Arab Emirates	1	0,92	7
Al-Fayoum University	Egypt	1	1,85	13
Cardiff Metropolitan University	United Kingdom	1	1,85	13

The top twenty individual authors are presented in the following table, which includes relevant bibliometric indicators, and Elsevier Scopus profile hyperlinks (for further reference).

Author	Affiliation	Country/Region	Scholarly Output	Field-Weighted Citation Impact	Cit. Count	Scopus author profile
Ashford, Nicholas	Massachusetts Institute of Technology	United States	2	0,77	8	https://www.scopus.com/authid/detail.url?authorId=7006210411
Fedorowicz-Kruszewska, Małgorzata	Nicolaus Copernicus University in Toruń	Poland	2	1,44	9	https://www.scopus.com/authid/detail.url?authorId=57208707097
Hall, Ralph P.	Virginia Polytechnic Institute and State University	United States	2	0,77	8	https://www.scopus.com/authid/detail.url?authorId=55448585700
$metric.entityName	Columbia University	United States	1	2,61	1	https://www.scopus.com/authid/detail.url?authorId=57950854100
$metric.entityName	Faculty of Agriculture and Forestry	-	1	0	0	https://www.scopus.com/authid/detail.url?authorId=58286749900
Abolghasemian, Samaneh	Shahid Beheshti University	Iran	1	6,67	106	https://www.scopus.com/authid/detail.url?authorId=57200127485
Ahmed, Mohamed Omar	Al-Fayoum University	Egypt	1	1,85	13	https://www.scopus.com/authid/detail.url?authorId=57196745148
Alabi, Adefunke O.	University of KwaZulu-Natal	South Africa	1	0,1	1	https://www.scopus.com/authid/detail.url?authorId=57197459114
Anser, Muhammad Khalid	Xi'an University of Architecture and Technology	China	1	0,92	7	https://www.scopus.com/authid/detail.url?authorId=57201617089
Barnes, Amanda	University of North	United	1	4,8	5	https://www.scopus.com/authid

C.	Carolina at Greensboro	States				/detail.url?authorId=57195561049
Beehner, Christopher Gerard	Seminole State College of Florida	-	1	0,44	3	https://www.scopus.com/authid /detail.url?authorId=57189715373
Boeve-de Pauw, Jelle	University of Antwerp	Belgium	1	0	0	https://www.scopus.com/authid /detail.url?authorId=35270983100
Bootpo, Wassana	Ramkhamheang University	-	1	0,66	6	https://www.scopus.com/authid /detail.url?authorId=57213822146
Cabral, Clement	Swinburne University of Technology	Australia	1	1,71	15	https://www.scopus.com/authid /detail.url?authorId=57209367232
Cao, Yi	Hebei Finance University	China	1	0	0	https://www.scopus.com/authid /detail.url?authorId=57581233600
Carlisle, Sheena	Cardiff Metropolitan University	United Kingdom	1	1,85	13	https://www.scopus.com/authid /detail.url?authorId=55221367000
Chen, Jiuming	China Xiongan Group	-	1	0	0	https://www.scopus.com/authid /detail.url?authorId=58103196000
Chen, Yuqing	Jiangsu University	China	1	2,11	1	https://www.scopus.com/authid /detail.url?authorId=58099346800
Cole, Laura B.	University of Missouri	United States	1	2,17	26	https://www.scopus.com/authid /detail.url?authorId=55856124900

Content analysis of the environmental (green) competence literature identifies 50 most relevant keyphrases, with their relevance shown by font size, and the relevance in the 2018-2022 period by font color (see following word cloud figure).

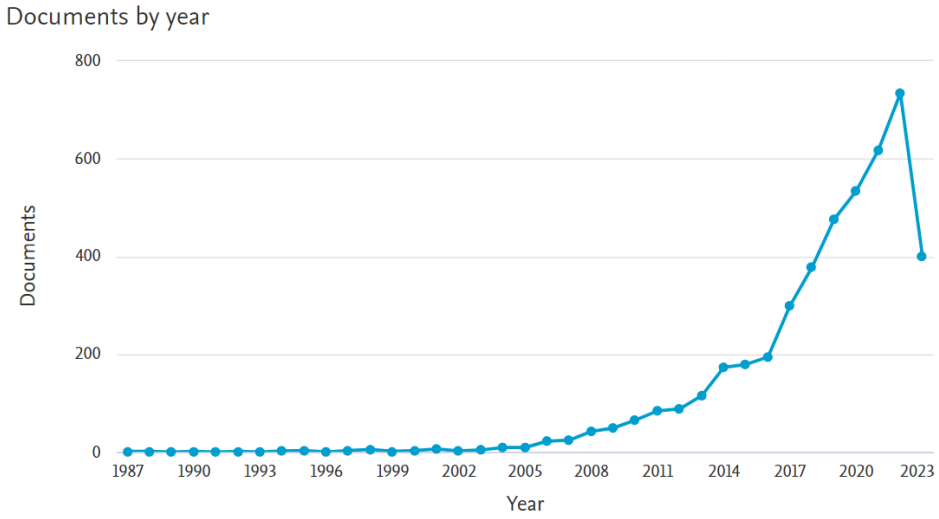
Measurement and evaluation of entrepreneurial competences

We used the following Scopus advanced query string:

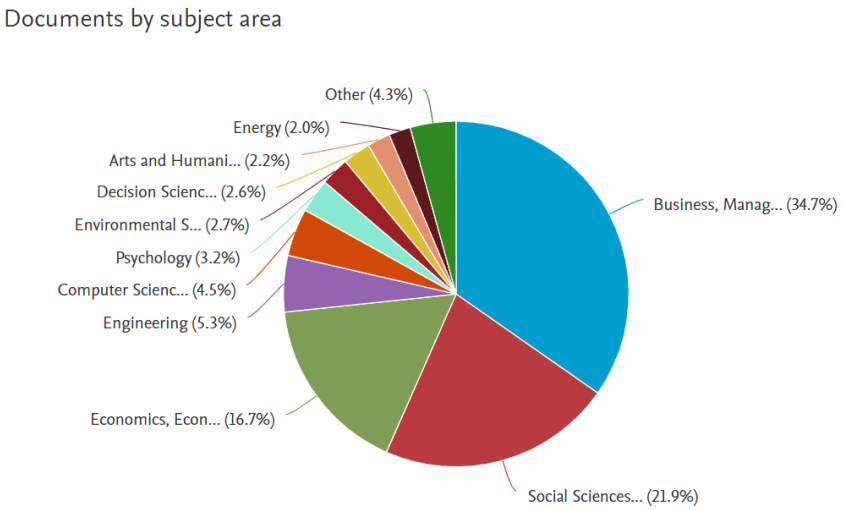
(entrepren* PRE/3 competen* OR entrepren* PRE/3 literac* OR entrepren* PRE/3 skill*) AND (assessment* OR evaluat* OR test* OR measur* OR questionnair* OR stud*) AND (universit* educat* OR academic educat* OR higher educat*)

Research on entrepreneurial competences is a more established academic topic, which is evident from the fact that the first records in the Elsevier Scopus reference database range back to 1987, as well as that the number of identified Scopus records is much higher than in the previous two cases. The used search query identified 4,524 scientific outputs in the 1987-2023 period. The researchers' interest for

the topic start growing rapidly as of 2017 (see the following figure). However, the number of available documents is smaller for 2023, since the bibliometric analysis was performed in July 2023, while the entire body of literature, produced in the current year, will be available in Scopus in early-to-mid 2024.

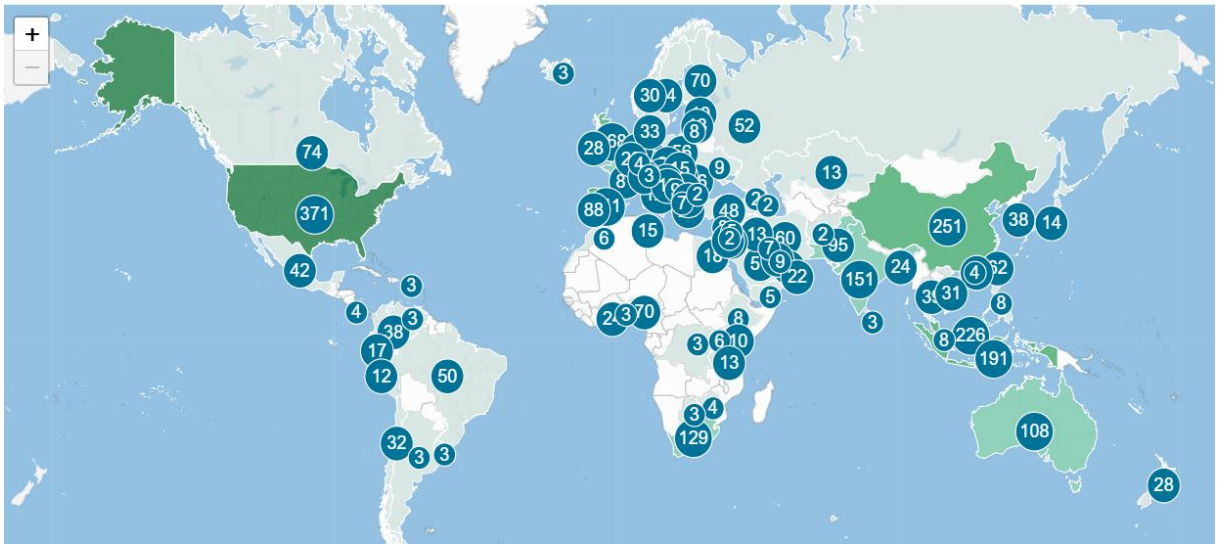


The entrepreneurial competence field is dominated by business and management research (34.7% of the analyzed body of literature), followed by social sciences (21.9%) and economics (16.7%), as demonstrated by the following figure.



Further analysis has been performed by using the advanced Elsevier SciVal tool for bibliometric analysis and reporting. Due to the limits of the SciVal platform, 3,062 papers, authored in the 2018-2023 period were finally considered for bibliometric analysis.

Geographical dispersion of the entrepreneurial competence literature is quite extensive, with the US, the UK, China and the EU countries producing most of the global research output (see following map).



The table view of the top ten countries, according to the research productivity and impact, shows that a cluster of entrepreneurial East Asian countries (Malaysia, Indonesia, and India), as well as South Africa, are among the most productive nations, according to research in entrepreneurial competencies. However, the highest multi-disciplinary scientific impact, measured by the FWCI indicator, is achieved by German and UK researchers.

Country/Region	Scholarly Output	Field-Weighted Citation Impact	Citation Count
United States	371	1,85	4985
United Kingdom	268	2,06	3666
China	251	1,36	1837
Spain	241	1,49	2477
Malaysia	226	1,36	1696
Indonesia	191	0,72	722
India	151	1,1	859
Germany	137	2,07	2086
South Africa	129	0,9	534
Italy	125	2	1756

Top ten institutions, engaged in entrepreneurial competence research, are as follows:

Institution	Country/Region	Scholarly Output	Field-Weighted Citation Impact	Citation Count
Universiti Teknologi Malaysia	Malaysia	27	0,35	67
University of Tehran	Iran	27	3,01	240
Instituto Tecnologico de Estudios Superiores de Monterrey	Mexico	26	2,18	299
Universiti Kebangsaan Malaysia	Malaysia	25	0,64	73
University of Beira Interior	Portugal	25	1,75	335

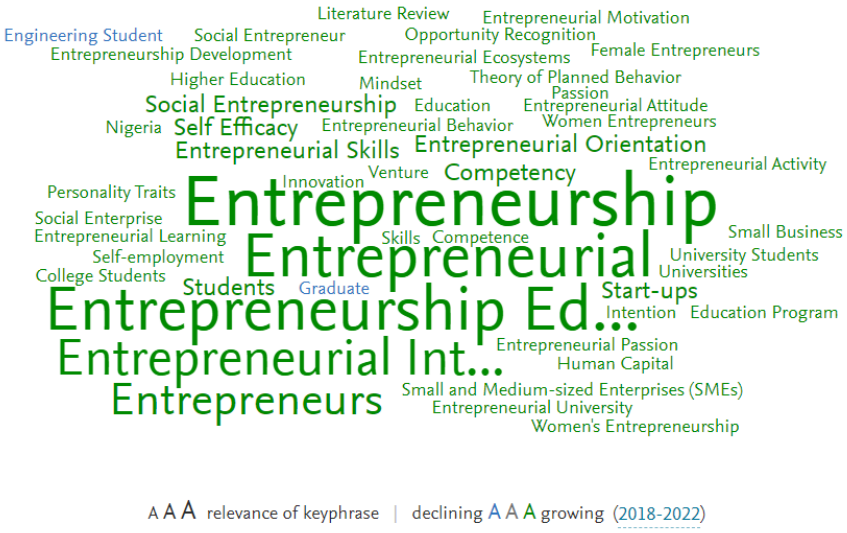
University of Pretoria	South Africa	23	0,48	89
University Utara Malaysia	Malaysia	23	3,34	331
State University of Jakarta	Indonesia	22	1	141
Universiti Malaysia Kelantan	Malaysia	22	0,75	126
Coventry University	United Kingdom	21	2,62	451

The top twenty individual authors, along with the indicators of their productivity and impact, as well as hyperlinks to their Elsevier Scopus author profiles (for further reference) are shown in the following table.

Author	Affiliation	Country/Region	Scholarly Output	Field-Weighted Citation Impact	Cit. Count	Scopus author profile
Wibowo, Agus	State University of Jakarta	Indonesia	15	1,2	99	https://www.scopus.com/authid/detail.url?authorId=57194217286
Mamun, Abdullah Al	Universiti Kebangsaan Malaysia	Malaysia	13	1,31	74	https://www.scopus.com/authid/detail.url?authorId=36782596500
Ferreira, João José M.Matos	University of Beira Interior	Portugal	12	2,29	260	https://www.scopus.com/authid/detail.url?authorId=25959981800
Marques, Carla Susana E.	Universidade de Trás-os-Montes e Alto Douro	Portugal	11	1,93	254	https://www.scopus.com/authid/detail.url?authorId=35224980700
Narmaditya, Bagus Shandy	State University of Malang	Indonesia	11	0,97	56	https://www.scopus.com/authid/detail.url?authorId=57194286237
Ramirez-Montoya, Maria Soledad	Instituto Tecnologico de Estudios Superiores de Monterrey	Mexico	10	2,22	110	https://www.scopus.com/authid/detail.url?authorId=54911980200
Hamdan, Allam Mohammed Mousa	Ahlia University	Bahrain	9	0,75	71	https://www.scopus.com/authid/detail.url?authorId=56825295800
Obschonka, Martin	Queensland University of Technology	Australia	9	8,43	665	https://www.scopus.com/authid/detail.url?authorId=35848937800
Bagheri, Afsaneh	University of Tehran	Iran	8	0,8	40	https://www.scopus.com/authid/detail.url?authorId=35118640000
Çera, Gentjan	Agricultural University of Tirana	Albania	8	1,57	79	https://www.scopus.com/authid/detail.url?authorId=57204419608
Dana, Léo Paul	Montpellier Business School	France	8	3,43	339	https://www.scopus.com/authid/detail.url?authorId=7003558061
Fayolle, Alain Jean Claude	Emlyon Business School	France	8	3,97	288	https://www.scopus.com/authid/detail.url?authorId=15062734100
Huang, Yangjie	Hangzhou Normal University	China	8	2,18	56	https://www.scopus.com/authid/detail.url?authorId=57218396928
Othman, Norasmah Hj	Universiti Kebangsaan Malaysia	Malaysia	8	0,91	40	https://www.scopus.com/authid/detail.url?authorId=35111555800
Ratten, Vanessa	La Trobe University	Australia	8	3,79	180	https://www.scopus.com/authid/detail.url?authorId=16307588600
Secundo, Giustina	Università LUM	-	8	2,04	140	https://www.scopus.com/authid/detail.url?authorId=8246738300
Shah, Naimatullah	University of Sindh	Pakistan	8	4,04	103	https://www.scopus.com/authid/detail.url?authorId=37089556800

Shepherd, Dean A.	University of Notre Dame	United States	8	6,98	488	https://www.scopus.com/authid/detail.url?authorId=7201684101
Soomro, Bahadur Ali	Universiti Malaysia Perlis	Malaysia	8	4,04	103	https://www.scopus.com/authid/detail.url?authorId=56515241200
Ataei, Pouria	Tarbiat Modarres University	Iran	7	1,38	69	https://www.scopus.com/authid/detail.url?authorId=56073206100

Content analysis of the entrepreneurial competence literature identifies 50 most relevant keyphrases, with their relevance shown by font size, and the relevance in the 2018-2022 period by font color (see following word cloud figure).



We conducted a preliminary, bibliometric analysis of the literature, focusing on measurement/evaluation/assessment of three competence frameworks, including digital, green, and entrepreneurial. We found relevant body of literature for each framework individually, but there is currently no substantial body of literature specifically addressing multiplicative effects and upskilling across all three domains. As evidenced by the top 50 keyphrases, competences are underdeveloped areas of focus in green and entrepreneurial domains, unlike digital competence framework. This further underscores the need for ongoing research in these areas, highlighting the lack of comprehensive exploration of the synergistic impacts and skill development across the mentioned domains.

3. Literature review

Following the bibliometric review shown above, we continued with a comprehensive and detailed literature review to identify and map the existing measurement frameworks, indicators, tools, and approaches related to digital, green, and entrepreneurial competences.

The following table shows measurement (descriptive) frameworks found in literature relevant for upskilling digital, green and entrepreneural competences.

Framework	Description	Tools developed based on the

		framework
Digital Competence Framework for Citizen	Developed by European Comission; provides a common understanding of what digital competence is, its latest edition identifies the key components of digital competence in 5 areas (information and data literacy; Communication and collaboration; Digital content creation; Safety; Problem solving)	Kozanoglu & Abedin (2021); Sicilia et al. (2018)
Green Competence Framework	Developed by European Comission; developed as a reference for learning schemes fostering sustainability as a competence; its latest edition identifies the key components in 4 areas (Embodying sustainability values, Embracing complexity in sustainability, Envisioning sustainable futures, Acting for sustainability)	Moon, C., Walmsley, A. & Apostolopoulos, N. (2022); Laherto et al. (2023); Sourgiadaki, M., & Karkalakos, S. (2023); Ilardo & Salinaro (2023)
Entrepreneurship Competence Framework	Developed by European Comission; explains what is an entrepreneurial mindset; its latest edition identifies the key components in 3 areas (Ideas and opportunities, Resources, Into action)	All Rațiu, A., Maniu, I., & Pop, E. L. (2023); Morselli & Gorenc (2022); López-Núñez MI., Rubio-Valdehita S, Armuña C., Pérez-Urria E. (2022); Joensuu-Salo, S., Viljamaa, A. and Varamäki, E. (2022): Baena-Luna, García-Río & Monge-Agüero (2019); Moon, C., Walmsley, A. & Apostolopoulos, N. (2022)
Green SCENT Framework	Aimed at educating European citizens to acquire green skills within the eight Focus Areas identified by the EU Green Deal Communication. Eight focus areas: Climate Change; Clean Energy; Circular Economy; Green Building; Smart Mobility; From Farm to Fork; Biodiversity; Zero Pollution; 11 competences.	Garito et al. (2023)

A thorough assessment of various tools for measuring digital, green, and entrepreneurial skills was conducted, yielding a list of tools like DigiCompWheel, My Digi skills, Sulitest, GrowINg, HEInnovate, and My EntreComp. The evaluation, detailed in the table below, provides essential information for each tool.

The review extends to both offline and online manifestations of these tools. Each was closely inspected and compared against the European Commission's (EC) tools to determine their comprehensiveness and suitability for the C2T project, encompassing both baseline and final assessments. This comparative analysis aimed to identify the tools that align most effectively with the specific needs of C2T pilot actions. European Commission's Digital, Green and Entrepreneurship Competence Framework (DigComp; GreenComp and EntreComp) were found to be the most comprehensive tools covering multiple areas, scientifically developed and publicly available as opposed to some of the tools outlined in the table.

Tools for skills measurement (aligned with DigiComp, GreenComp and EntreComp)

Tool	Stakeholders	Description	Language	Prices	URL	CompFrame work alignment	Comments

Tool	Stakeholders	Description	Language	Prices	URL	CompFramework alignment	Comments
DigiComp Wheel	Individuals, Organization, HEI	Questionnaire, 15 minutes, self-evaluation	entered by partners	(149-1525 EUR/year Basic, Custom), Enterprise (100 mappings)	https://digital-competence.eu/	**Digi Comp** (Problem solving is missing)	14-days trial free, 4 comp groups (Information, communication, Production, Safety), measuring attitude, skill, knowledge
My Digi skills	Individuals, Organization, HEI	Questionnaire, 20 minutes, self-evaluation (82 questions)	11	Free	https://mydigiskills.eu/	**DigiComp**	measuring level, discovering Gaps, guidelines for improvement
TASK (Sulitest)	Individuals, Organization, HEI	Questionnaire, self-evaluation (45 questions), 10 skills	English and French	Various options (University: 50 EUR/program (min 50 vouchers); 25EUR/graduate)	https://en.sulitest.org/	consistent with **GreenComp, SDG** education learning objectives	testing and certifying knowledge, registered users with access to Knowledge Hub offering reports, certificates and case studies
GrowINg	Individuals, SME	Questionnaire, 80 minutes, self-evaluation (112 questions)	English, Portuguese, Greek	Free	http://growing-project.eu/	**EntreComp** (workers entrepreneurial skills)	Erasmus+ project output, 10 competencies, 4 levels of proficiency; Handbook for Entrepreneurial Skilled Employees included
Female Entrepreneur Self-Assessment Tool	Individuals	Questionnaire, 15 minutes, self-evaluation	6 languages	Free	https://www.femalentrepreneur.eu/en/competences	**EntreComp**	Erasmus+ project output, Online tool, basic assessment, test for soft skills available
HEInnovate	HEI	Questionnaire, 20 minutes, self-evaluation (103 questions)	English	Free	https://www.heinnovate.eu/en	**EntreComp** for HE	Reports, option for results classification
My EntreComp	Individuals	Questionnaire, self-evaluation (60 questions)	English	One assessment and report 0.49 GBP	https://myentrecomponline.com/	**EntreComp**	Note: additional info is not available without registering and paying.

While the aforementioned tools are valuable, it is important to note that none of them fully aligns with the specific objectives of our project. That is why we are undertaking the development of a tool tailored to meet the unique requirements and goals of our project. This decision ensures a more precise and effective alignment with project's objectives, thereby enhancing overall project performance and outcomes. DigiComp, GreenComp and EntreComp frameworks are robust resources for assessing competences across multiple domains and this is why they are chosen as a base for developing DGE skills' measurement tool. The latest editions of frameworks are presented in the following subsections.

DIGITAL competence framework

In our exploration of various frameworks for reviewing the literature on upskilling processes, the European Commission's Digital Competence Framework for Citizens (DigComp) emerged as the most robust and comprehensive choice. DigComp offers a shared comprehension of the concept of digital competence. DigComp is an important tool to support the EU's Digital Education Action Plan 2021-2027, which contributes to the Commission's priority "A Europe fit for the Digital Age" and to Next Generation EU.

In DigComp, digital competence involves the "confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It is defined as a combination of knowledge, skills and attitudes." (Council Recommendation on Key Competences for Lifelong Learning, 2018). The latest edition, DigComp 2.2[1], refines the DigComp framework by identifying five key competence areas that further enhance its applicability and relevance to the evolving landscape of digital skills (Vuorikari, Kluzer and Punie, 2022):

- Information and data literacy: To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.
- Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital presence, identity and reputation.

Competence areas

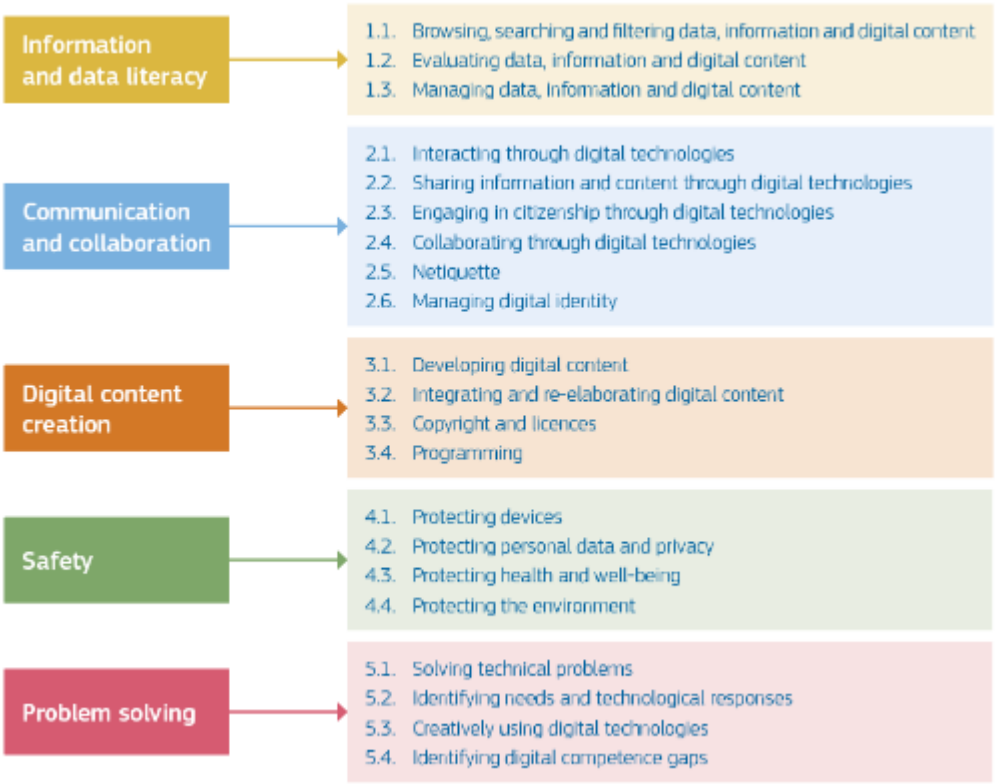
- Digital content creation: To create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.
- Safety: To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.

[1] https://joint-research-centre.ec.europa.eu/digcomp/digcomp-framework_en

- Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.

In total, there are 21 competences, their titles and descriptors are outlined in Dimension 2. Taken together, Dimensions 1 and 2 form the **conceptual reference model**. Additional Dimensions outline Proficiency levels (Dimension 3), Examples of knowledge, skills and attitudes (Dimension 4) and Use cases (Dimension 5).

The DigComp Conceptual reference model



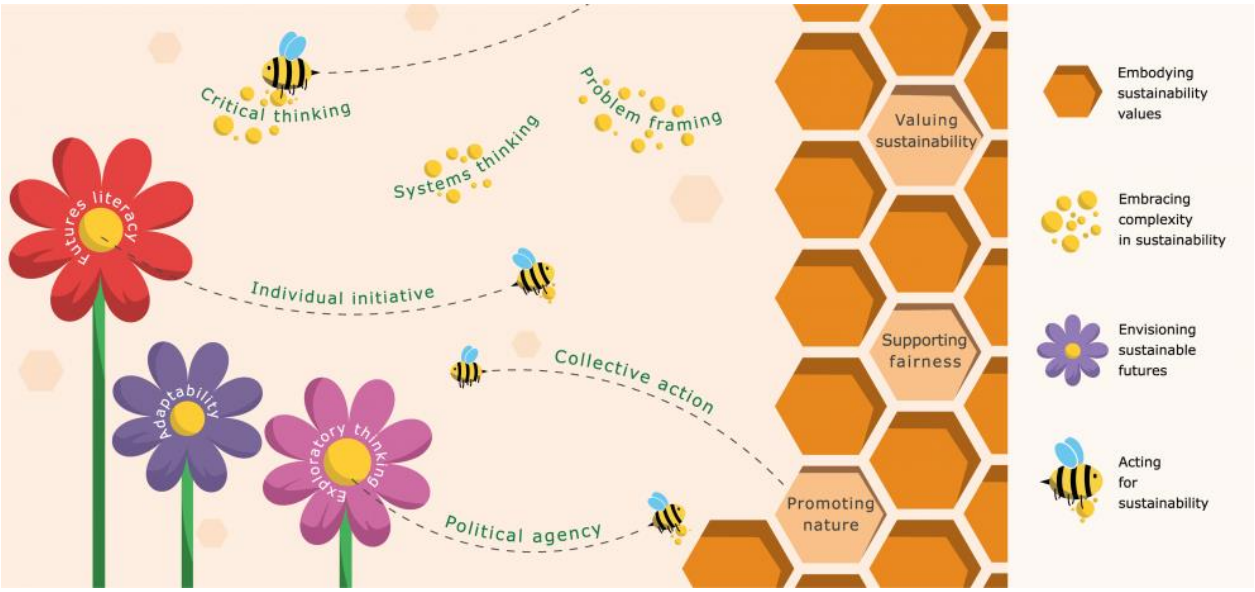
Titles, descriptors, and other information extracted from DigComp dimensions 3, 4, and 5 were instrumental in shaping the self-evaluation survey outlined in the table below.

Question No.	Competence area	Question	Competence
1.1.	Information and data literacy	browse, search and filter data, information and digital content.	**Browsing, searching and filtering data, information and digital content**
1.2.		evaluate (analyze, compare and critically evaluate) data, information and digital content.	**Evaluating data, information and digital content**
1.3.		manage (organize, store and retrieve in a structured environment) data, information and digital content.	**Managing data, information and digital content**
2.1.	Communication and collaboration	interact through a variety of digital technologies and understand appropriate digital communication means for a given context.	**Interacting through digital technologies**
2.2.		share data, information and digital content with others through appropriate digital technologies following referencing and attribution practices.	**Sharing through digital technologies**
2.3.		participate in society through the use of public and private digital services, seeking opportunities for self-empowerment and participatory citizenship.	**Engaging in citizenship through digital technologies**
2.4.		use digital tools and technologies for collaborative processes and for co-construction	**Collaborating through digital technologies**

Question No.	Competence area	Question	Competence
		and co-creation of resources and knowledge.	
2.5.		being aware of behavioural norms and know-how while using digital technologies and interacting in digital environments, including cultural and generational diversity	**Netiquette**
2.6.		create and manage one or multiple digital identities, protect my reputation and deal with the data that I produce.	**Managing digital identity**
3.1.	Digital content creation	create and edit digital content in different formats and express myself through digital means.	**Developing digital content**
3.2.		modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.	**Integrating and re-elaborating digital content**
3.3.		understand how copyright and licences apply to data, information and digital content.	**Copyright and licences**
3.4.		plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.	**Programming**
4.1.	Safety	protect devices and digital content and I understand risks and threats in digital environments, including safety and security measures, reliability and privacy.	**Protecting devices**
4.2.		protect personal data and privacy in digital environments and understand how to use and share personally identifiable information while being able to protect myself and others from damages.	**Protecting personal data and privacy**
4.3.		avoid health risks and threats to physical and psychological well-being while using digital technologies and protect myself and others from possible dangers in digital environments.	**Protecting health and well-being**
4.4.		I am aware of the environmental impact of digital technologies and their use.	**Protecting the environment**
5.1.	Problem solving	I can identify technical problems when operating devices and using digital environments, and solve them.	**Solving technical problems**
5.2.a		assess needs and identify, evaluate, select and use digital tools and possible technological responses to solve them.	**Identifying needs and technological responses**
5.2.b		adjust and customise digital environments to personal needs (e.g. accessibility).	**Identifying needs and technological responses**
5.3.		use digital tools and technologies to create knowledge and to innovate processes and products, as well as resolve conceptual problems and problem situations in digital environments.	**Creatively using digital technologies**
5.4.		understand where my digital competence needs to be improved or updated, seek opportunities for self-development, and keep up-to-date with the digital evolution.	**Identifying digital competence gaps**

GREEN competence framework

GreenComp 2022[2] consists of 12 competencies organised into four areas: embodying sustainability values, embracing complexity in sustainability, envisioning sustainable futures and acting for sustainability. The four competence areas are closely interconnected, with sustainability as a competence encompassing all four collectively. The 12 sustainability competences are likewise interlinked and interrelated, emphasizing the need to consider them as integral parts of a cohesive whole.



GreenComp Visualisation © EC 2022

Descriptors and other information extracted from GreenComp dimensions were used in creating the self-evaluation survey outlined in the table below.

Question No.	Competence area	Question	Competence
1.1.	Embodying sustainability values	reflect on personal values; identify and explain how values vary among people and over time and how they align with sustainability values.	**Valuing sustainability**
1.2.		support equity and justice for current and future generations and learn from previous generations for sustainability.	**Supporting fairness**
1.3.		acknowledge that humans are part of nature and respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.	**Promoting nature**
2.1.	Embracing complexity in sustainability	Approach sustainability problem from all sides, considering time, space and context in order to understand how elements interact within and between systems.	**Systems thinking**

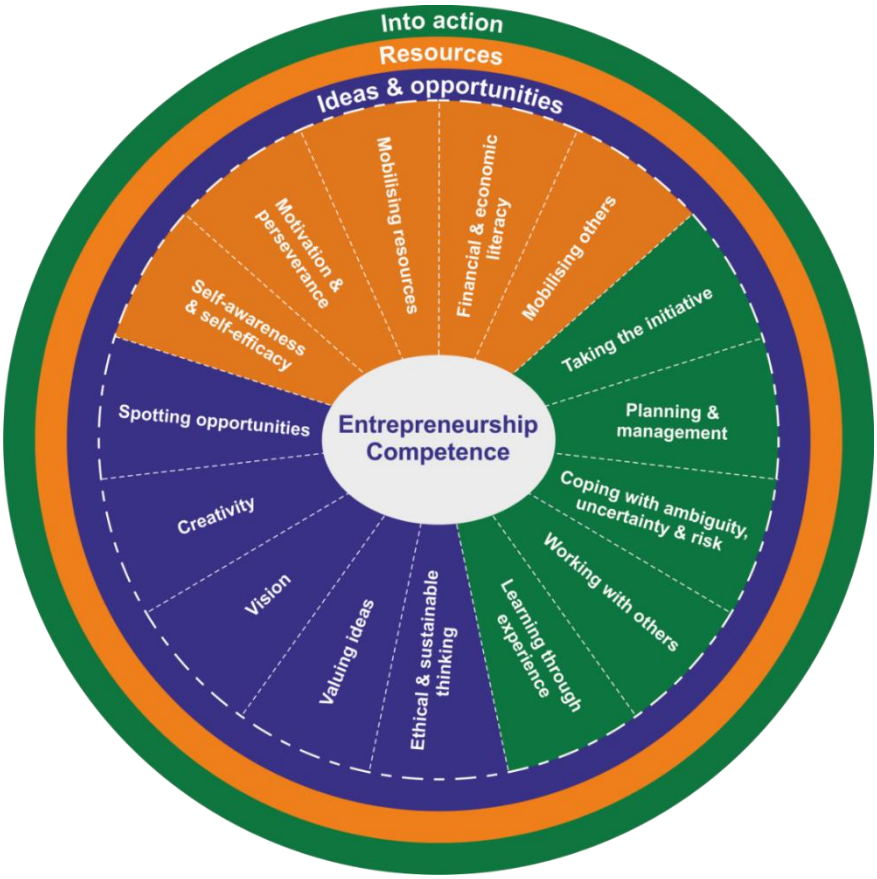
[2]https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework/greencomp-conceptual-reference-model_en

Question No.	Competence area	Question	Competence
2.2.		assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.	**Critical thinking**
2.3.		formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope.	**Problem framing**
3.1.	Envisioning sustainable futures	envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.	**Futures literacy**
3.2.		manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.	**Adaptability**
3.3.		adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.	**Exploratory thinking**
4.1.	Acting for sustainability	navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.	**Political agency**
4.2.		act for change in collaboration with others.	**Collective action**
4.3.		identify own potential for sustainability and actively contribute to improving prospects for the community and the planet.	**Individual initiative**

ENTREPRENEURSHIP competence framework

The European Commission has developed EntreComp, the European Entrepreneurship Competence Framework as a reference framework to explain entrepreneurial mindset.

The EntreComp consist of the 3 competence areas and 15 competences as illustrated in the figure below.



EntreComp[3] serves as a guide for designing curricula within formal education and training. Additionally, it proves valuable for initiatives and initiatives in nonformal learning settings, such as promoting intrapreneurship within established organizations. The objective is to create a connection between the realms of education and work concerning entrepreneurship as a competence.

Hints and descriptions for each competence from EntreComp dimensions in creating the self-evaluation survey shown in the table below.

Question No.	Competence area	Question	Competence
1.1.	Ideas and opportunities	identify and seize opportunities to create value (needs to be met) by exploring the social, cultural and economic landscape.	**Spotting opportunities**
1.2.		develop several ideas and opportunities to create value, including better solutions to existing and new challenges, combining knowledge and resources to	**Creativity**

[3] https://publications.jrc.ec.europa.eu/repository/handle/JRC101581

		achieve valuable effects.	
1.3.		develop a vision to turn ideas into action and visualize future scenarios to help guide effort and action.	**Vision**
1.4		judge what value is in social, cultural and economic terms and recognise the potential an idea has for creating value and identify suitable ways of making the most out of it.	**Valuing ideas**
1.5a		assess the consequences of ideas that bring value and the effect of entrepreneurial action on the target community, the market, society and the environment and act responsibly.	**Ethical and sustainable thinking**
1.5b		Reflect on how sustainable long-term social, cultural and economic goals are, and the course of action chosen.	**Ethical and sustainable thinking**
2.1.	Resources	reflect on own needs, aspirations and wants in the short, medium and long term to strengthen belief in own ability to influence the course of events, despite uncertainty, setbacks and temporary failures.	**Self-awareness and self-efficacy**
2.2.		determined to turn ideas into action and satisfy own needs to achieve while simultaneously being patient and resilient under pressure, adversity, and temporary failure.	**Motivation and perseverance**
2.3.		get and manage, often limited, material, non-material and digital resources as well as needed competencies at any stage to turn ideas into action.	**Mobilizing resources**
2.4.		estimate the cost of turning an idea into a value-creating activity and manage financing to make sure value-creating activity can last over the long term.	**Financial and economic literacy**
2.5.		inspire and enthuse relevant stakeholders to get support needed to achieve valuable outcomes by effective communication, persuasion, negotiation and leadership.	**Mobilizing others**
3.1.	Into action	act and work independently to achieve goals, stick to intentions and carry out planned tasks in order to initiate processes that create value.	**Taking the initiative**
3.2.		set long-, medium- and short-term goals, define priorities and action plans and adapt to unforeseen changes.	**Planning and management**
3.3.a		make decisions when the result of that decision is uncertain, when the information available is partial or ambiguous, or when there is a risk of unintended outcomes.	**Coping with uncertainty, ambiguity and risk**
3.3b		Within the value-creating process, include structured ways of testing ideas and prototypes from the early stages, to reduce risks of failing.	**Coping with uncertainty, ambiguity and risk**
3.4.		work together and cooperate with others to develop ideas, turn them into action, solve conflicts, and face up to competition positively when necessary.	**Working with others**
3.5.		use any initiative for value creation as a learning opportunity, learning with others and from both success and failure (own and other people's).	**Learning through experience**

4. Measuring the impact of upskilling actions

Measuring the impact of upskilling actions (also called pilot actions) is crucial to assessing the success of individual upskilling actions and the overall C2T project. That is why creating a **monitoring and evaluation (M&E) plan** is essential to properly track key components and steps of pilot actions and their impact on participants' digital, green and entrepreneurial competences.

Monitoring and evaluation protocol for measuring the impact of upskilling actions consists of the following key steps:

1. Defining the **objectives** of each upskilling action and indicating the desired skills (DGE competences) participants are expected to acquire. This would need to be a part of the template for describing each action within the action plans.
2. Setting **data collection methods and protocol**: conducting self-assessments for all participants (stakeholders) before and after taking part in upskilling pilot actions.
3. Setting **evaluation and reporting** mechanisms.

By clearly articulating upskilling actions' objectives, project partners establish a framework for measuring actions' success and their impact on participants' skills.

On the **overall project level**, the focus will be on building and activating a cross-regional support network of BSOs in order to strengthen skills and capacities of CCIs, sustainable tourism SMEs and other stakeholders.

Before being involved with C2T pilot actions, each participant (stakeholder) needs to complete a baseline self-assessment for digital, green, and entrepreneurial competences. Participants will be invited to complete post-action self-assessments for DGE competences. This will serve as a measure of the effectiveness of the upskilling actions and their programs. In addition, it will assist in measuring the impact of upskilling actions at the project level. Data collected will be used to identify areas for improvement and refinement in future upskilling initiatives.

Project partners will implement a feedback mechanism designed to demonstrate participants' skill enhancement resulting from pilot actions.

The following sub-chapters will provide more details about each step of the protocol for measuring the effects of upskilling actions for DGE competences.

Data collection methods and protocol

The collection of quantitative data related to Digital Green Entrepreneurial (DGE) competences will be primarily facilitated through a questionnaire, encompassing not only participants' progress in acquiring DGE competences, but also essential demographic information. Further to that, within WP2, and in line with the WP1 methodological setup (in particular D1.3.3 Upskilling support methodology and D1.4.1 Capacity building strategy), the collected quantitative data will focus on:

- **Pre- and Post-assessments**: Conducted to evaluate the participants' proficiency levels before and after the upskilling intervention.
- **Attendance Rates**: Tracked diligently to understand the level of engagement and commitment among participants for each upskilling action.
- **Completion Rates**: Measured to evaluate the overall success of participants in completing each upskilling activity.

Data from attendance and completion rates will be cross-referenced with organizational records.

Complementing the quantitative data, qualitative insights will also need to be gathered such as:

- **Participant Interviews**: In-depth interviews will be conducted to delve into participants' experiences, challenges, and the perceived impact of the upskilling program on their professional growth. Every project partner will ensure participants for three interviews (preferably with at least one technology provider, one technology host and one CI) as final activity of capacity building program.
- **Success Stories/Case Studies**: Real-life case studies will be explored through D2.3.3 Report on BuildingBridges PILOT action, showcasing success stories and lessons learned, contributing to a richer qualitative analysis.

Before the C2T upskilling pilot actions begin, every stakeholder i.e. participant will complete a baseline self-assessment that will evaluate the existing competence levels in digital, green, and entrepreneurial areas. This assessment will result in quantitative metrics, showing the proficiency level of each competence and its area.

After upskilling actions, the participants will complete the **self-assessment** survey once again. This process will offer valuable insights to determine their current skills status and will enable project partners to assess the extent of improvements achieved. As a follow-up, qualitative insights could be gathered through surveys and interviews to provide a holistic understanding of the assessments.

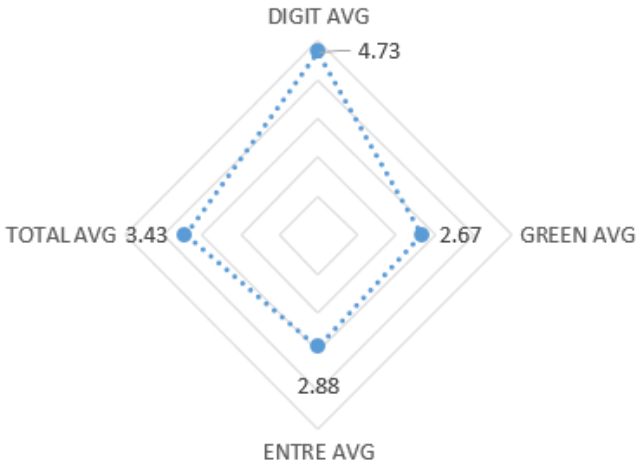
The questionnaire for DGE skills self-assessment is prepared in software Qualtrics using European Commission's DigComp, GreenCom and EntreComp as the basis (Appendix 1). By filling in the questionnaire, stakeholders e.g. participants will estimate the level of their proficiency in different DGE areas and skills, where 1 means they have no skills or do not know how to perform the related task; 2 means they can perform a simple task with autonomy and appropriate guidance when needed; 3 means they can perform the task on their own and solve straightforward problems; 4 means they can perform the task at an advanced level according to their own needs and those of others in the complex context; 5 means they can perform the task at a highly specialized level in the complex context while guiding others.

To ensure the smooth execution of data collection, the data collection team will be responsible for administering assessments and maintaining attendance records for each upskilling activity. The team responsible for data collection will be arranged with the **IAG technical committee** and appointed as responsible for the actions in question:

- Pre-assessment: Conducted at the commencement of the upskilling activity.
- Post-assessment: Administered after the upskilling activity.

The pre-assessment questionnaire is available at:
https://usplit.eu.qualtrics.com/jfe/form/SV_0cc7X6yXkMQ7iHs.

If the participant attends more than one upskilling activity, (s)he conducts the self-assessment only two times, indicating actions (s)he attended within the action plan/IAG (s)he is a part of. Because of this, the questionnaire can only be finalised once the action plans are finalised and adopted.



Render of a baseline assessment per user (TBC)

Evaluation and reporting mechanisms

To ensure efficient data analysis, the clear responsibilities of the **analysis team** should be outlined. This team should comprise different individuals skilled in both quantitative and qualitative analysis to interpret the gathered data.

Throughout the upskilling actions within IAGs, **periodic progress reports** will be prepared by project partners to track the progress of actions. Reports will be made and discussed on a semi-annual basis within project partners' bi-monthly meetings.
The reports will show the average ratings for each user and upskilling action in each of C2T's three thematic areas:

1. Digital (5 competence areas and 21 competences)
2. Green (4 competence areas and 12 competences)
3. Entrepreneurial (3 competence areas and 15 competences)

Periodic progress report will be prepared by IAGs and will consist of:

- Number and list of upskilling actions conducted,
- Number of participants attended,
- Pre-assessment skill proficiency scores and post-assessment levels of participants (if collected).

A final impact evaluation report will be made upon finalizing all project actions and collecting all data. It will show a number of actions made to reflect on the progress made made by participants in upskilling their competences. This report is part of D3.1.3 Reports on statistical analysis and peer exchange activities.

To efficiently track and manage participants' progress, project partners will consider **digital solutions for progress reporting**. Project partners will seek opportunities to develop progress reports using different tools and applications for visualisation and comparison purposes in particular.

Render of a baseline detailed assessment per user using the Sunburst Chart (GreenComp)

	Competence area: Acting for sustainability	Upskilling progress	Competence: Political agency	Competence: Collective action	Competence: Individual initiative
Average value before	3.7	7.5%	3.6	3.6	4.0
Average value after	**4.0**		**4.0**	**3.8**	**4.2**

Example of a group analysis for participants who took part in green upskilling actions - showcasing one green competence area and their corresponding competences

5. Use case

Before implementing any upskilling activities, we conducted pre-tests using the competence measurement toolkit to estimate the levels of digital, green, and entrepreneurial competences among project partner staff. The purpose of the exercise is to evaluate the effectiveness of the upskilling program on project staff competences as well, specifically in providing consultancy in the given thematic topics.

The results of the baseline self-assessment for competences are presented in the infographic below. A baseline self-assessment for digital, green, and entrepreneurial competences has been completed with the participation of 41 project partner (PP) members representing all 11 partners across 9 countries. The infographic illustrates the average scores attained by the C2T team in each competence framework, with blue representing digital, orange for entrepreneurial, and green for green competence areas. Notably, the project team scored equally well in the digital and entrepreneurial areas (3.65), while the green competence framework achieved a score of 3.46.

C2T team average scores for DGE competence areas

The tables below display the baseline average scores for each competence area per PP member. Rubric codes are utilized to anonymize the names and will remain consistent throughout subsequent self-assessment following the upskilling actions in which project partners will be involved.

Scores per PP member in digital competence areas

Rubic code	Digital competence areas					
	Information and data literacy	Communication and collaboration	Digital content creation	Safety	Problem solving	Average value
ANA13	4.00	4.00	4.00	4.00	3.00	3.80
ves77	4.67	4.67	4.00	4.00	3.80	4.23
ADA23	4.00	3.83	4.50	3.75	4.40	4.10
BPM11	4.67	4.17	3.75	4.25	3.20	4.01
MIR19	3.00	3.83	3.25	2.50	2.60	3.04
ADA44	5.00	5.00	4.50	4.75	4.60	4.77
JNE88	3.67	3.67	3.50	3.50	3.00	3.47
NKA40	5.00	4.50	4.75	5.00	4.60	4.77
MIR01	4.33	4.67	3.25	2.25	2.20	3.34
MLH88	4.00	3.00	3.25	3.00	3.00	3.25
LP11	4.00	3.67	3.75	2.75	2.60	3.35
ILO14	4.00	4.00	4.00	4.00	3.60	3.92
milo05	4.00	3.67	2.50	2.00	2.20	2.87
750519	5.00	4.83	4.50	4.25	4.40	4.60
VIA87	5.00	4.50	4.50	3.50	4.40	4.38
PPW55	4.00	3.67	3.25	3.75	3.40	3.61
ALI86	5.00	4.00	3.75	3.50	3.80	4.01
SAR027	4.00	4.00	2.50	1.75	2.80	3.01
MIC11	4.33	3.83	3.00	3.25	3.20	3.52
Mar-48	3.33	3.67	2.50	2.75	3.00	3.05
SMO91	4.33	4.00	3.50	3.25	3.00	3.62
MCVE85	4.33	3.67	3.75	2.50	3.40	3.53
JDA35	4.33	4.50	4.00	4.00	4.60	4.29
esa20	4.67	4.67	4.00	4.50	4.40	4.45
SMC23	5.00	4.00	3.00	2.25	2.20	3.29
md478sm	4.00	4.00	3.00	3.00	3.00	3.40
SBTP4321	3.00	3.00	3.00	2.75	2.00	2.75
IRI223	5.00	5.00	4.00	4.25	4.80	4.61
AJA25	4.00	3.67	3.50	3.00	3.80	3.59
ELA777	4.00	2.83	1.50	2.50	2.00	2.57
JK22	5.00	4.00	3.50	2.25	2.80	3.51
2910	3.67	3.33	3.00	3.25	3.00	3.25
BANA30	3.67	4.83	3.50	3.50	3.00	3.70
BdZ1975	3.00	2.17	2.00	2.00	2.00	2.23
URA06	2.67	3.33	3.25	2.50	2.20	2.79
Oli123	5.00	4.33	3.25	3.00	3.80	3.88
CBTEC4I	5.00	4.67	4.25	3.75	3.20	4.17
GBL33	5.00	3.83	3.75	3.75	4.00	4.07
JPV12	4.33	3.17	4.00	2.50	3.40	3.48
EVA11	4.67	4.00	4.00	3.25	2.40	3.66
3B97747	4.00	3.67	3.75	3.50	3.00	3.58

Scores per PP member in green competence areas

Rubic code	Green competence area				Average value
	Embodying sustainability values	Embracing complexity in sustainability	Envisioning sustainable futures	Acting for sustainability	
ANA13	2.00	1.67	1.00	1.00	1.42
ves77	4.33	3.67	3.33	4.33	3.92
ADA23	3.33	2.67	2.33	2.67	2.75
BPM11	4.67	3.33	3.00	3.33	3.58
MIR19	3.67	3.00	2.33	2.67	2.92
ADA44	4.00	3.67	4.00	3.33	3.75
JNE88	4.00	2.67	3.00	3.33	3.25
NKA40	3.33	3.33	2.00	2.00	2.67
MIR01	4.33	4.67	4.00	4.67	4.42
MLH88	4.00	4.00	4.00	3.67	3.92
LP11	4.33	3.00	3.67	3.67	3.67
ILO14	4.00	3.33	3.00	4.00	3.58
milo05	3.67	3.33	4.00	3.67	3.67
750519	4.00	4.33	4.00	4.67	4.25
VIA87	3.00	3.00	3.00	3.00	3.00
PPW55	3.33	3.33	3.67	3.33	3.42
ALI86	4.33	3.33	3.33	4.33	3.83
SAR027	4.00	4.00	4.00	4.00	4.00
MIC11	5.00	4.00	4.00	4.00	4.25
Mar-48	4.00	3.67	3.33	3.67	3.67
SMO91	4.00	3.00	3.00	3.33	3.33
MCVE85	4.33	3.67	4.33	4.67	4.25
JDA35	4.00	3.67	3.33	3.33	3.58
esa20	4.67	3.33	3.33	3.67	3.75
SMC23	3.00	2.00	2.00	2.67	2.42
md478sm	3.00	3.00	3.00	3.00	3.00
SBTP4321	3.00	3.00	3.00	3.00	3.00
IRI223	3.67	3.67	2.67	2.67	3.17
AJA25	3.67	3.67	4.00	3.67	3.75
ELA777	1.33	1.67	2.00	2.33	1.83
JK22	5.00	4.00	4.00	4.00	4.25
2910	3.00	3.00	3.67	3.00	3.17
BANA30	4.33	4.67	3.67	4.67	4.33
BdZ1975	2.00	2.00	3.00	2.33	2.33
URA06	3.67	3.33	3.00	2.00	3.00
Oli123	4.00	3.33	3.67	3.67	3.67
CBTEC4I	4.00	4.00	4.33	4.67	4.25
GBL33	5.00	4.33	4.33	4.33	4.50
JPV12	2.67	3.33	4.33	3.67	3.50
EVA11	4.67	3.33	3.00	3.00	3.50
3B97747	3.67	3.00	3.33	3.67	3.42

Scores per PP member in entrepreurship competence areas

Rubic code	Entrepreneurship competence area			Average value
	Ideas and opportunities	Resources	Into action	
ANA13	1.00	2.00	2.67	1.89
ves77	4.67	4.20	4.50	4.46
ADA23	3.33	3.20	3.67	3.40
BPM11	2.83	2.60	2.67	2.70
MIR19	3.00	3.00	3.00	3.00
ADA44	3.50	3.60	3.33	3.48
JNE88	3.50	3.80	3.17	3.49
NKA40	3.00	2.80	2.83	2.88
MIR01	4.17	3.40	4.50	4.02
MLH88	4.00	4.00	3.83	3.94
LP11	3.17	2.60	2.50	2.76
ILO14	3.67	3.40	3.67	3.58
milo05	3.50	3.20	3.50	3.40
750519	4.50	4.40	4.50	4.47
VIA87	3.00	3.00	3.67	3.22
PPW55	3.83	3.60	3.50	3.64
ALI86	4.33	3.60	4.50	4.14
SAR027	4.00	4.40	4.50	4.30
MIC11	3.83	3.60	3.83	3.76
Mar-48	3.50	3.80	3.83	3.71
SMO91	4.00	3.40	3.33	3.58
MCVE85	4.00	3.80	4.17	3.99
JDA35	4.83	4.80	5.00	4.88
esa20	4.83	4.00	4.33	4.39
SMC23	3.67	3.60	4.00	3.76
md478sm	4.00	4.00	4.00	4.00
SBTP4321	3.00	3.00	3.00	3.00
IRI223	4.33	4.40	4.33	4.36
AJA25	4.00	3.80	4.00	3.93
ELA777	2.17	3.20	3.17	2.84
JK22	4.50	4.40	4.00	4.30
2910	2.50	2.40	2.50	2.47
BANA30	4.50	3.60	5.00	4.37
BdZ1975	2.00	2.00	2.50	2.17
URA06	3.50	3.40	3.67	3.52
Oli123	4.00	3.80	4.00	3.93
CBTEC4I	4.00	4.40	4.83	4.41
GBL33	4.50	4.00	4.67	4.39
JPV12	4.17	4.20	3.50	3.96
EVA11	3.17	3.00	4.17	3.44
3B97747	4.00	3.60	4.00	3.87

6. Proposed content of the final Toolkit

The final Competence toolkit will be updated with the results of the participant's self-assessments and based on the analysis of results.

Executive summary

1. Introduction

2. Bibliometric review

Measurement and evaluation of digital competences

Measurement and evaluation of green competences

Measurement and evaluation of entrepreneurial competences

3. Literature review

DIGITAL competence framework

GREEN competence framework

ENTREPRENEURSHIP competence framework

4. Measuring the impact of upskilling actions

Data collection methods and protocol

Evaluation and reporting mechanism

Timelines and responsibilities

5. Project results

Participant Skill Assessment Results: DGE proficiency before and after

Measuring the project's impact

Use Cases

References

Appendix 1: Self-assessment questionnaire

Appendix 2: Progress report example

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