



# Pilot Test Global Report

Work Package 4 – Task 4.2

Date: **November 2023**





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# 1 Summary of course exploitation during Pilot Test

## 1.1 Schedule and intermediate review of Pilot Test exploitation

According to the project description, the Pilot Test was scheduled to take place during the 2<sup>nd</sup> half of the 3<sup>rd</sup> project year, followed by the field trial conducted throughout the whole 4<sup>th</sup> year. However, some partners started earlier than originally planned as described in the "Plan for Pilot Test and Field Trial" (T4.1). These adjustments were made to accommodate the needs of the project and ensure its successful completion. However, all partners still had the opportunity to continue developing the courses until March 2023 and the Pilot Test could continue until 4<sup>th</sup> year start (M36). Thus, some partners have not yet finished their Pilot Test and the purpose of this intermediate report is to **provide feedback and recommendations before Field Trial start**, which is scheduled to begin on M36 and to last the full 4<sup>th</sup> year.

During the work on Training design (WP3), **42 main courses** were developed for **initial and continuous VET** with an even distribution between modes of delivery: **14 on-site/face-to-face trainings, 13 online trainings and 15 hybrid trainings** (see **Table 2**). For a detailed course content description, visit ECoVEM courses platform (<https://courses-ecovem.eu/>) and see WP3 report. These courses can be classified in one or several of the **7 main course categories** described in **Table 1**. The **courses cover EQF levels from 3 to 8**, and the **curricula of some partners** (P01 TUS, P03 SCAS, P09 IAL, P12 INES) **have a modular structure with adapted content to various EQF levels**, providing flexibility for the trainees to select the appropriate training and acquire a wide range of skills and knowledge according to suitable learning outcomes. The courses for soft skills are convenient for all EQF levels. The training courses for **EQF levels from 4 to 6** are predominantly represented in ECoVEM curriculum as these profiles are strategic for the microelectronic industry.

*Table 1: Description of the main course categories of ECoVEM curriculum and number of available courses by EQF level*

#	Course categories	Modular courses by EQF level		
		EQF3	EQF4	EQF5
1	Design and manufacture of PCB			
2	Microelectronics packaging technologies			
3	Fundamentals of microelectronics manufacturing	11	21	24
4	Integrated circuits design			
5	System design			
6	Microelectronics for a greener economy			
7	Key competences and transversal skills			
		EQF6	EQF7	EQF8
		25	12	4

Each partner delivered the ECoVEM courses according to their internal rules, guidelines, procedures, and timeline. This allowed for great flexibility within the consortium to adjust the ECoVEM curriculum and training to their operational preferences and reach the widest and most meaningful group of users for the training's validation.

**Table 2** summarizes the course exploitation during the Pilot Test, specifying course number and categories, mode of delivery, EQF levels of the specific modular trainings, starting date of exploitation, course duration (workload), as well as the number of participants who registered and who completed each course to date.



Table 2: Summary of course exploitation during Pilot Test

Course number	Partner	Country	Course category - reference numbers	Course name	Mode of delivery	EQF level	Starting date	Duration (workload)	# of participants who started the pilot test course to date	# of participants who completed the pilot test course to date	Total started / course	Total completed / course	Completion rate (%)
1	P01 TUS	Bulgaria	1, 2, 3 - 1.01; 2.01; 3.01	PCB Design, Assembling and Packaging	hybrid	3	2023-03	180 h	3	3	38	33	86,8%
						4	2023-03	180 h	5	3			
						5	2023-03	180 h	8	5			
						6	2023-03	180 h	22	22			
2	P01 TUS	Bulgaria	1, 4, 5 - 1.02, 4.01, 5.01	FPGA Design and Fabrication	hybrid	5	2022-10	150h	3	3	20	17	85,0%
						6	2022-10	150h	7	4			
						7	2022-10	150h	10	10			
3	P1 TUS & AMG Technology	Bulgaria	1, 3, 4, 5 - 1.03, 3.02, 4.02, 5.02	Fabrication of Silicon Microsystems	On site	5	2023-04	120h	Industrial confidentiality agreement				
						6	2023-04	120h					
						7	2023-04	120h					
4	P01 TUS	Bulgaria	2, 3 - 2.02; 2.03	Microelectronics Packaging Technologies	hybrid	4	2023-04	180h	4	2	40	34	85,0%
						5	2023-04	180h	6	3			
						6	2023-04	180h	12	11			
						7	2023-04	180h	18	18			
5	P01 TUS	Bulgaria	4, 5 - 4.03; 5.03	Design of ICs with CADENCE	hybrid	6	2022-10	180h	5	3	24	22	91,7%
						7	2022-10	180h	7	7			
						8	2022-10	180h	12	12			
6	P1 TUS & MELEXIS	Bulgaria	3 - 3.04	CMOS technology process	On site	6	2023-04	80h	Industrial confidentiality agreement				
						7	2023-04	80h					
7	P1 TUS & Bosch ECS	Bulgaria	3 - 3.05	Test Engineering for Automotive Electronics	On site	6	2023-04	80h	Industrial confidentiality agreement				
						7	2023-04	80h					
8	P1 TUS & Bosch ECS	Bulgaria	5 - 5.04	Embedded Systems for Automotive Industry	On site	6	2023-04	80h	Industrial confidentiality agreement				
						7	2023-04	80h					
9	P1 TUS & Bosch ECS	Bulgaria	5 - 5.05	C++ for Automotive Electronics	On site	6	2023-04	80h	Industrial confidentiality agreement				
						7	2023-04	80h					
10	P03 SCAS	Bulgaria	7 - 7.01	Entrepreneurship and validation of prior learning in electronics	hybrid	4	2023-07	75h	10	8	16	13	81,3%
						5	2023-07	75h	6	5			
11	P03 SCAS	Bulgaria	7 - 7.02	Artificial Intelligence and Student Career Development	hybrid	4	2023-07	75h	9	8	14	12	85,7%
						5	2023-07	75h	5	4			
12	P05 J-ArtEck	Germany	7 - 7.03	Applied Intercultural Communication	On site	3	2023-08	15h	68	68	68	68	100,0%
13	P06 SEMI	Germany	3 - 3.06	SEMI Standards Educational Series for E10 and E79	online	3	2023-08	4h	Free webinars - no metrics				
14	P06 SEMI	Germany	3 - 3.07	Ultra-Pure Water & Liquid Chemicals Quality Control Webi	online	3	2023-08	0h30					
15	P06 SEMI	Germany	3 - 3.08	Voltage Sag for Manufacturing Fabs Overview	online	3	2023-08	4h					



Course number	Partner	Country	Course category - reference numbers	Course name	Mode of delivery	EQF level	Starting date	Duration (workload)	# of participants who started the pilot test course to date	# of participants who completed the pilot test course to date	Total started / course	Total completed / course	Completion rate (%)
16	P08 Exolaunch	Germany	2, 3, 5 - 2.03, 3.09, 5.06	Microelectronics for Space applications	hybrid	6		120h	14	14	14	14	100,0%
17	P08 Exolaunch	Germany	7 - 7.04	Presentation Skills, Pitching	hybrid	5		90h	16	16	16	16	100,0%
18	P08 Exolaunch	Germany	7 - 7.05	Project Management	hybrid	6		50h	18	18	18	18	100,0%
19	P08 Exolaunch	Germany	7 - 7.06	Survival in the Labour Market	hybrid	4		50h	17	17	17	17	100,0%
20	P09 IAL FVG	Italy	7 - 7.07	The Entrepreneurial Mindset for professional success	On site	4	2023-5	12h	22	22	22	22	100,0%
21	P09 IAL FVG	Italy	5 - 5.07	Digital modeling and manufacturing technician (digital maker)	On site	3	2022-10	1056h	19	15	19	15	78,9%
22	P09 IAL FVG	Italy	5 - 5.08	Digital modeling and manufacturing technician (digital maker)	On site	4	2022-10	1056h	10	8	10	8	80,0%
23	P12 INES	France	6 - 6.01	Principle of photovoltaic (PV) cells and the different PV cell technologies	On site	6	2022-09	14h	92	90	137	131	95,6%
						7	2022-11	14h	45	41			
24	P12 INES	France	6 - 6.02	Manufacturing standard silicon photovoltaic (PV) cells: Theory and technological responses	On site	7	2022-05	21h	31	31	38	37	97,4%
						8	2023-04	21h	7	6			
25	P12 INES	France	6 - 6.03	Fabrication, characterization and ageing of photovoltaic modules: Theory and technological responses	On site	7	2022-05	14h	22	22	31	31	100,0%
						8	2023-02	14h	9	9			
26	P14 ANCCP	Spain	4, 5 - 4.04, 5.09	Circuit Training with Analog Devices Alternating Current (CTAD-AC)	online	3	2023-05	25h	0	0	13	2	15,4%
						4	2023-05	25h	0	0			
						5	2023-05	25h	13	2			
27	P14 ANCCP	Spain	4, 5 - 4.05, 5.10	Circuit Training with Analog Devices Direct Current (CTAD-DC)	online	3	2023-05	25h	0	0	20	6	30,0%
						4	2023-05	25h	0	0			
						5	2023-05	25h	20	6			
28	P14 ANCCP	Spain	4, 5 - 4.06, 5.11	Training in Electronic Circuits with Analog Devices TECAD	online	4	2023-05	50h	0	0	19	2	10,5%
						5	2023-05	50h	0	0			
						6	2023-05	50h	19	2			



Course number	Partner	Country	Course category - reference numbers	Course name	Mode of delivery	EQF level	Starting date	Duration (workload)	# of participants who started the pilot test course to date	# of participants who completed the pilot test course to date	Total started / course	Total completed / course	Completion rate (%)	
29	P16 UNED	Spain	4, 5 - 4.07, 5.12	Task-oriented simulation with OrCAD Pspice	online	4	2023-04	75h	3	1	33	3	9,1%	
						5	2023-04	75h	5	0				
						6	2023-04	75h	25	2				
30	P16 UNED	Spain	3, 5, 6 - 3.10, 5.13, 6.04	Bridge the Gap: Photovoltaic Systems	online	4	2023-09	90h	2	0	20	8	40,0%	
						5	2023-09	90h	18	8				
31	P16 UNED	Spain	3 - 3.11	Foundations on Microelectronics	online	4	2023-09	60h	4	1	29	2	6,9%	
						5	2023-09	60h	25	1				
32	P16 UNED	Spain	6, 7 - 6.05, 7.08	Smart Industry and Circular Economy	online	4	2023-09	50h	4	0	17	0	0,0%	
						5	2023-09	50h	0	0				
						6	2023-09	50h	13	0				
33	P16 UNED	Spain	4, 5, 6 - 4.08, 5.14, 6.06	Foundations and Simulations on FPGAs	online	4	2023-09	50h	1	0	29	3	10,3%	
						5	2023-09	50h	3	0				
						6	2023-09	50h	25	3				
34	P16 UNED	Spain	6, 7 - 6.06, 7.09	Overview of Biotechnology and Microelectronics from the Point of View of Gender, Equality and People Integration	online	3	2023-09	50h	2	0	30	12	40,0%	
						4	2023-09	50h	1	0				
						5	2023-09	50h	27	12				
35	P16 UNED	Spain	1, 2, 3 - 1.04, 2.04, 3.12	Basics of microelectronics manufacturing processes	online	4	2023-09	250h	0	0	22	0	0,0%	
						5	2023-09	250h	22	0				
36	P17 CPC	Cyprus	6 - 6.08	Automotive electronics - Advanced ECU systems (control and Microelectronics) Architecture microelectronics of Telematics control units (TECU) in vehicles	On site	6	2023-01	130h	26	24	26	24	92,3%	
37	P17 CPC	Cyprus	6 - 6.09	PVTRIN Training and Certification Scheme for Photovoltaic Technicians	On site	5	2023-02	185h	25	22	25	22	88,0%	
TT01	P17 CPC	Cyprus	Teachers' training	Train the trainers ( professional training instructors)	On site	5	2023-02	32h	22	20	22	20	90,9%	
38	P21 ROMIT	Bulgaria	1 - 1.05	Design and fabrication of PCB	Hybrid	6	2023-3	60h	10	10	10	10	100,0%	
39	P21 ROMIT	Bulgaria	5 - 5.15	Microprocessor systems	Hybrid	6	2023-3	60h	16	14	16	14	87,5%	
40	P21 ROMIT	Bulgaria	4, 5 - 4.09, 5.16	Computer modelling and simulation in Analogue electronics	Hybrid	6	2023-3	60h	32	25	32	25	78,1%	
41	P21 ROMIT	Bulgaria	6 - 6.10	Introduction to Internet of Things (IoT)	Hybrid	6	2023-3	60h	23	22	23	22	95,7%	
42	P21 ROMIT	Bulgaria	6 - 6.11	LoraWan technology	Hybrid	7	2023-3	60h	18	18	18	18	100,0%	
											<b>Total</b>	<b>946</b>	<b>701</b>	<b>74,1%</b>





Guidelines for innovative teaching approaches was developed and P01 TUS and P17 CPC delivered a specific Teachers' training (TT01 in **Table 2**) on pedagogical methodologies. Other partners (P12 INES, P16 UNED) delivered technical teachers' trainings adapted from ECoVEM courses and thus are already included in the Pilot Tests statistics (see partners' Pilot Tests reports and Teachers' trainings report R3.5).

## 1.2 Evaluation of courses – Plan for Pilot Test and Field Trial (T4.1)

The evaluation of the courses is essential to provide the partner organizations with a feedback which firstly offers quality control in terms of teaching performance and secondly, evaluate the success of the Pilot Test and identify areas for improvement in preparation for the Field Trial phase (e.g. changes in course content, teaching methods, etc.).

As described in the Plan for Pilot Test and Field Trial (T4.1), the course evaluations by trainees and teachers have been conducted entirely via online surveys using EU Survey software (<https://ec.europa.eu/eusurvey/auth/login>) as it complies with data protection measures at the European level.

After the conclusion of the pilot test, all partners were asked to complete a template Pilot Test report, with a further data analysis homogenization thanks to an Excel file template for data treatment. The pilot test templates were developed by P07 TUB and P12 INES.

All reports of the 10 partners who developed and delivered ECoVEM courses can be found in **Annex I** (separate file).

## 2 Statistical information on the trainees and analysis

### 2.1 Trainees by partners' countries

To date, **946 trainees have registered** for one of the 42 ECoVEM courses and **701 completed** their corresponding pilot test course and **Figure 2** shows the number of participants who registered and who completed the pilot test courses, respectively, according to VET providers' countries. The Spanish partners (P14 ANCCP and P16 UNED) offer exclusively online courses, which explains the big difference between registration and completion rates as this mode of delivery is much more flexible but implies difficulties of attendance (see Table 2). For instance, it seems that all non-Spanish trainees registered only to see the content, educational activities and ideas, probably to apply them in their curriculum or syllabus (see UNED Pilot Test report – Annex I).

The objective of the pilot test was to involve **minimum of 30 trainees per country**, which is already **well exceeded** by the VET providers in the project.

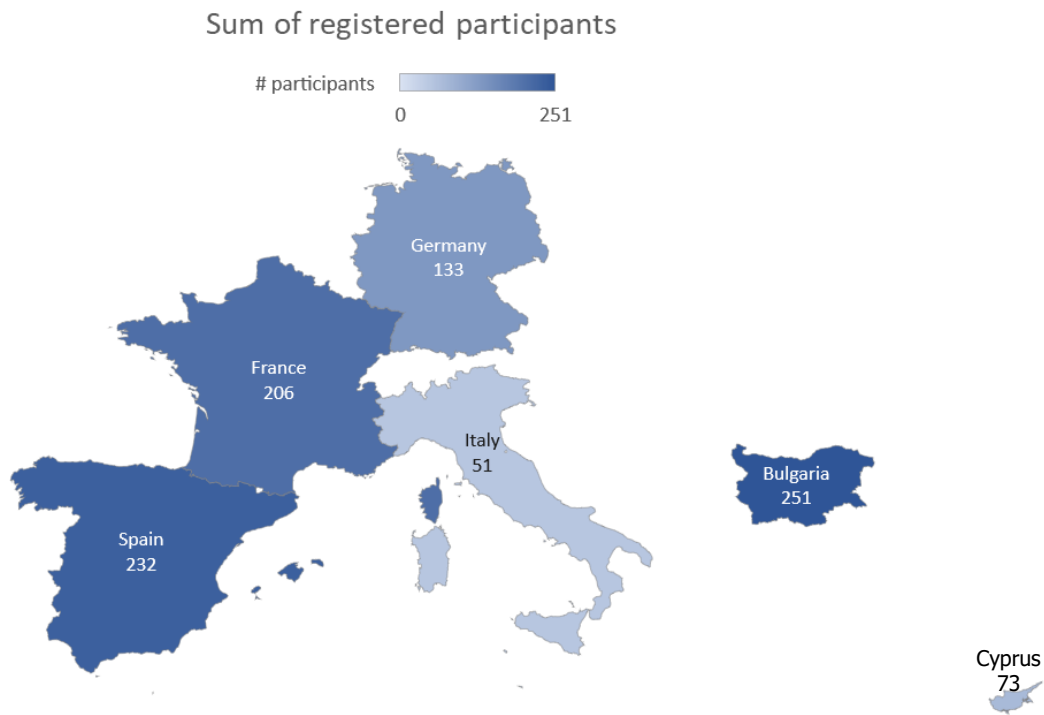


Figure 1 : Number of participants who registered and/or started the pilot test courses to date

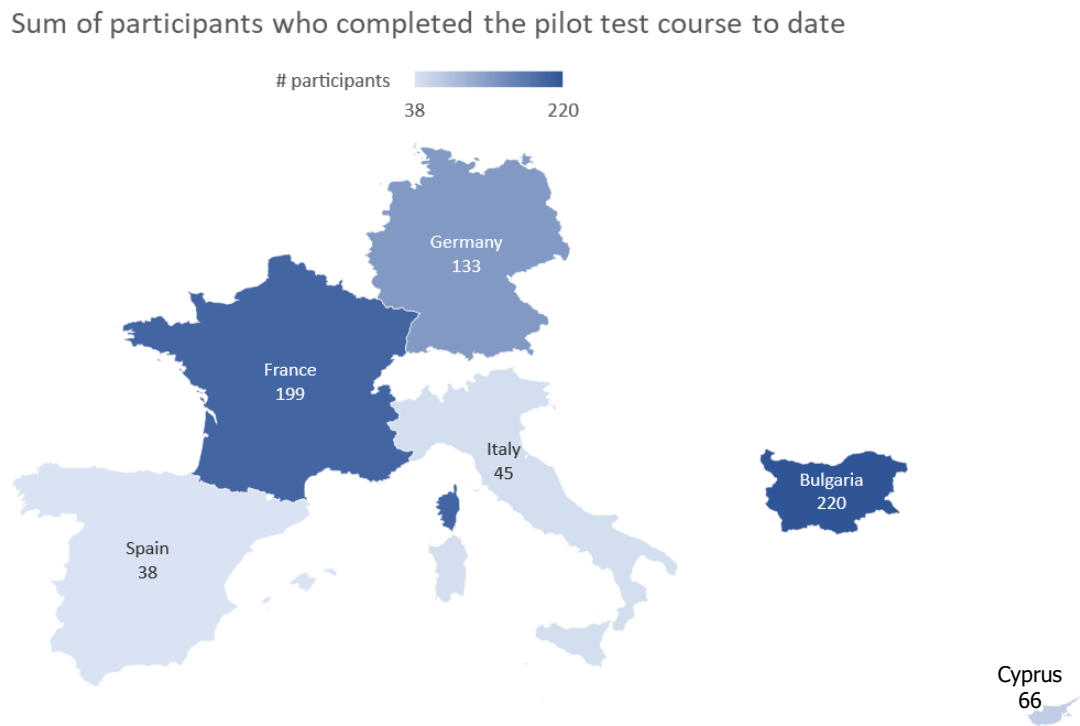


Figure 2 : Number of participants who completed the pilot test courses to date



## 2.2 Trainees gender

Figure 3 shows the distribution of gender among ECoVEM trainees during Pilot Test. Thanks to the satisfaction surveys and the registration forms (for online courses), the statistics are relevant as they apply to **787 trainees, i.e. 599 men (76%), 183 women (23%)** and 5 people (1%) who feel non binary or did not answer (see Figure 3). These proportions are typical of the scientific sector and in particular of the microelectronic sector. It can be highlighted however that the gender distribution is clearly different from one country to another, which should be further investigated according to EQF level, nationality, mode of delivery or type of skills (hard skills vs. soft skills):

- **Italy** (P09 IAL FVG – EQF 3-4; on-site; soft & hard; 51 participants):  
**98% men / 0% women / 2% non-binary or no answer**
- **Cyprus** (P17 CPC – EQF 5-6; on-site; hard; 73 participants):  
**89% men / 11% women / 0% non-binary or no answer**
- **Spain** (P14 ANCCP + P16 UNED – EQF 3-6; online; soft & hard; 220 participants):  
**84.1% men / 14.1% women / 1.8% non-binary or no answer**
- **France** (P12 INES – EQF 6-8; on-site; hard; 201 participants):  
**79% men / 21% women / 0% non-binary or no answer**
- **Germany** (P05 J-ArtEck – EQF 3; on-site; soft; 59 participants):  
**62% men / 38% women / 0% non-binary or no answer**
- **Bulgaria** (P01 TUS + P03 SCAS + P21 ROMIT – EQF 3-8; on-site & hybrid; soft & hard; 266 participants):  
**57.4% men / 42.6% women / 0 % non-binary or no answer**

Thus, Bulgaria appears to be the most advanced country in women integration in the Microelectronics training sector and collaborative work may be engaged between partners in order to highlight the reasons and to foster the potential means and opportunities for more attractive jobs in Microelectronics for women.

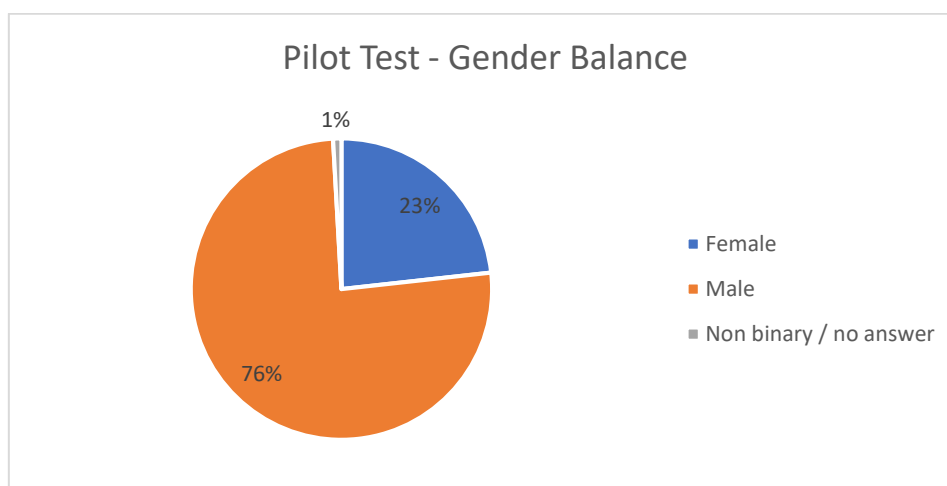


Figure 3: Gender balance of the Pilot Test



## 2.3 Trainees nationality

Figure 4 shows the distribution of ECoVEM trainees nationalities around the World, which covers 43 countries. There are obviously a high percentage of trainees from partners' countries but relatively few come from other European countries. Furthermore, it can be highlighted that Spanish partners logically attract Spanish speaking trainees from South America and French partner attract French speaking trainees from Africa and Middle East. Besides, the "Intercultural Communication Training" provided by partner P05 J-ArtEck was mainly attended by immigrants from Turkmenistan and Uzbekistan.

- For the courses of P1 TUS, 13 students form countries outside the partnership registered and 5 of them completed the course. Additionally, **2 trainees from Italy, 1 from Germany and 1 from Spain** completed the course.
- For the courses developed by P09 IAL, 5 students form countries outside the partnership completed the course.
- For P12 INES, 36 students form countries outside the partnership (and **1 from Italy**) completed the course.
- For P16 UNED, 20 students form countries outside the partnership (and **12 from Germany**) completed the course.
- However, for P21 ROMIT, **17 students form countries inside the partnership** completed the course (5 from countries outside the partnership).

As it is one of the WP4 Exploitation objectives, efforts must be done during Field Trial phase to foster intra-European mobility within partners' network.

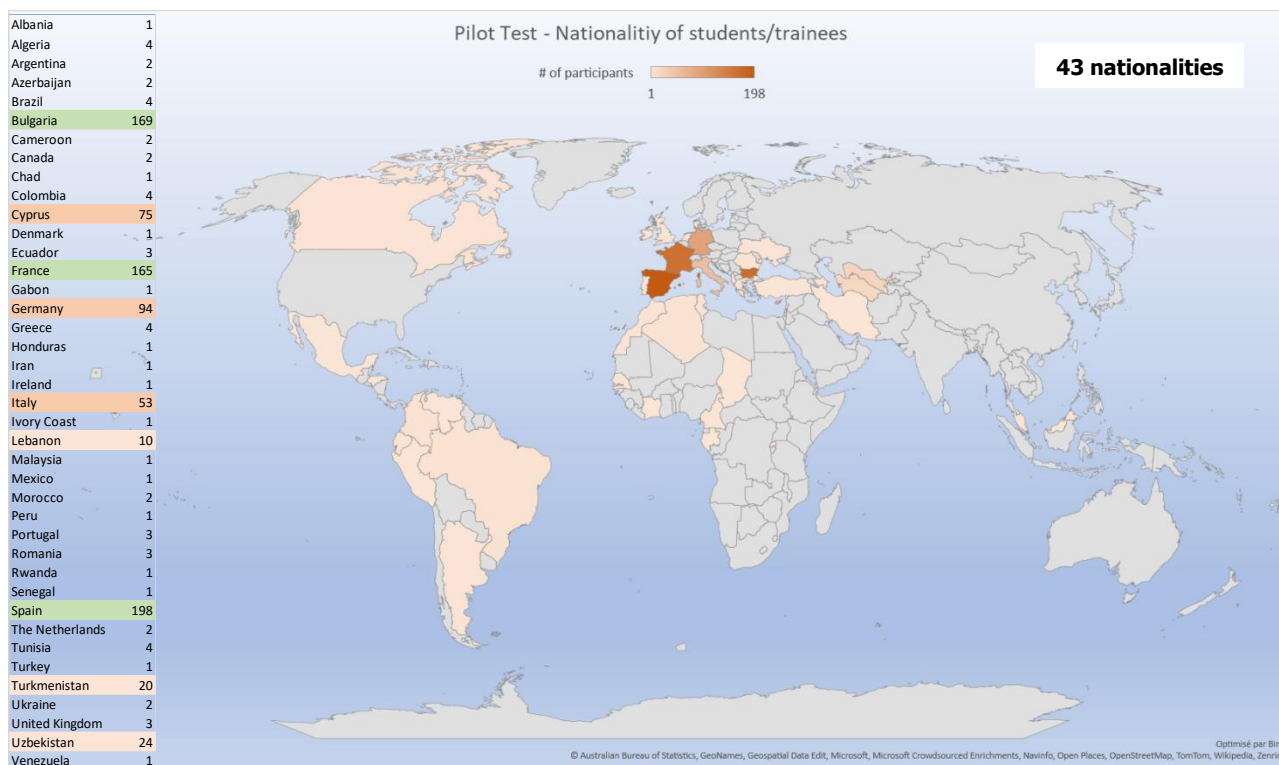


Figure 4 : Distribution of the nationalities of ECoVEM trainees during the Pilot Tests phase



## 2.4 Course EQF balance

Figure 5 shows the distribution of ECoVEM trainees according to the EQF level of the modular course they attended, and differentiating those who registered (946) and those who completed the course to date (701):

- 86 completed courses of EQF level 3
- 70 completed courses of EQF level 4
- 107 completed courses of EQF level 5
- 264 completed courses of EQF level 6
- 147 completed courses of EQF level 7
- 27 completed courses of EQF level 8

As already stated, the main explanation for low completion rates for EQF 5 and 6 comes from online courses as this mode of delivery is much more flexible but implies difficulties of attendance

However, the **Pilot Test objective** was a minimum of **50 trainees on EQF 3-4, 50 on EQF 4-5, and 100 on EQF 6-8**. Thus, the Pilot Test largely exceeded expectations.

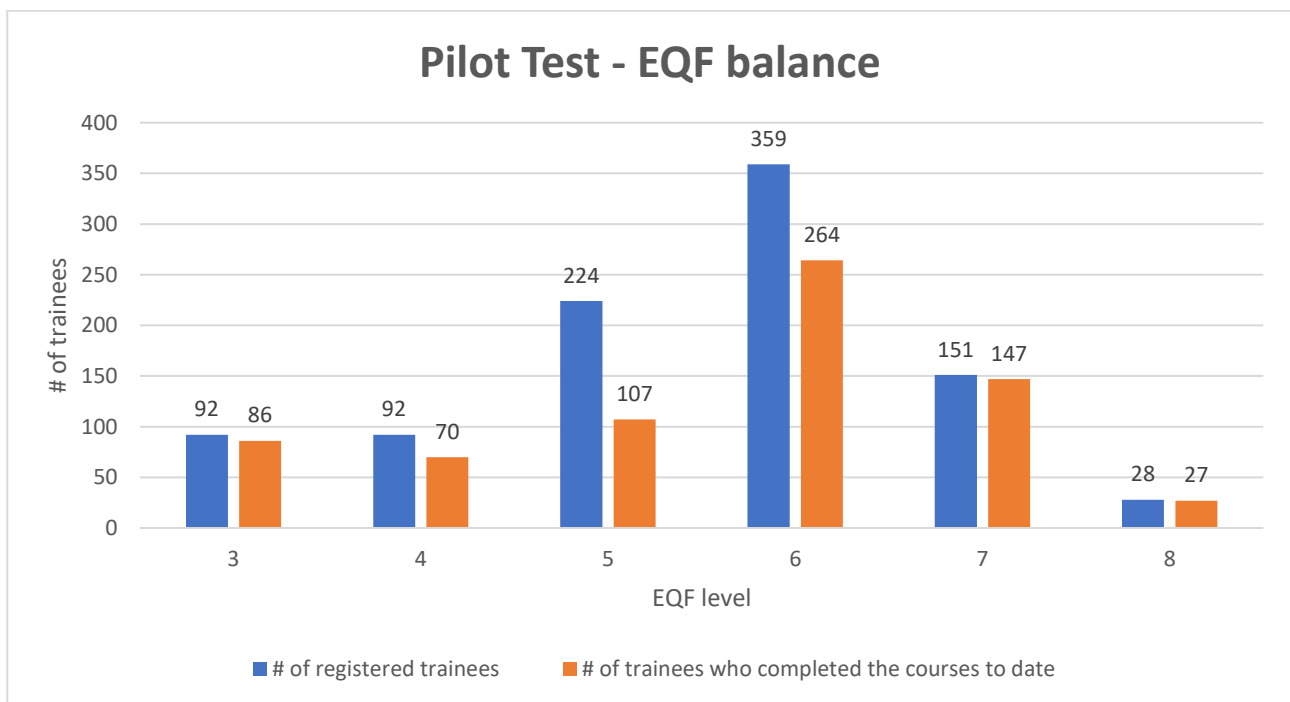


Figure 5: Distribution of ECoVEM trainees during Pilot Test according to the EQF level of the course they attended.



### 3 Overall evaluation and future improvements

#### 3.1 Overall satisfaction rate

Out of the 701 trainees who completed their courses, 469 (67%) answered to the satisfaction survey. From an overall point of view, the courses delivered by ECoVEM partners were judged by students and teachers as satisfactory from both a design and delivery point of view. Indeed, **92% are satisfied** (very good or good) and **54% are very satisfied** (very good – see Figure 6).

Table 3 shows the satisfaction rate of ECoVEM trainees for each individual course. Detailed evaluation of each individual course (such as structure, material, relevance, duration, level...) can be found in each partner Pilot Test report (Annex I). Strengths and areas of improvements of the courses are detailed in the next section, thanks to the open questions of the satisfaction surveys.

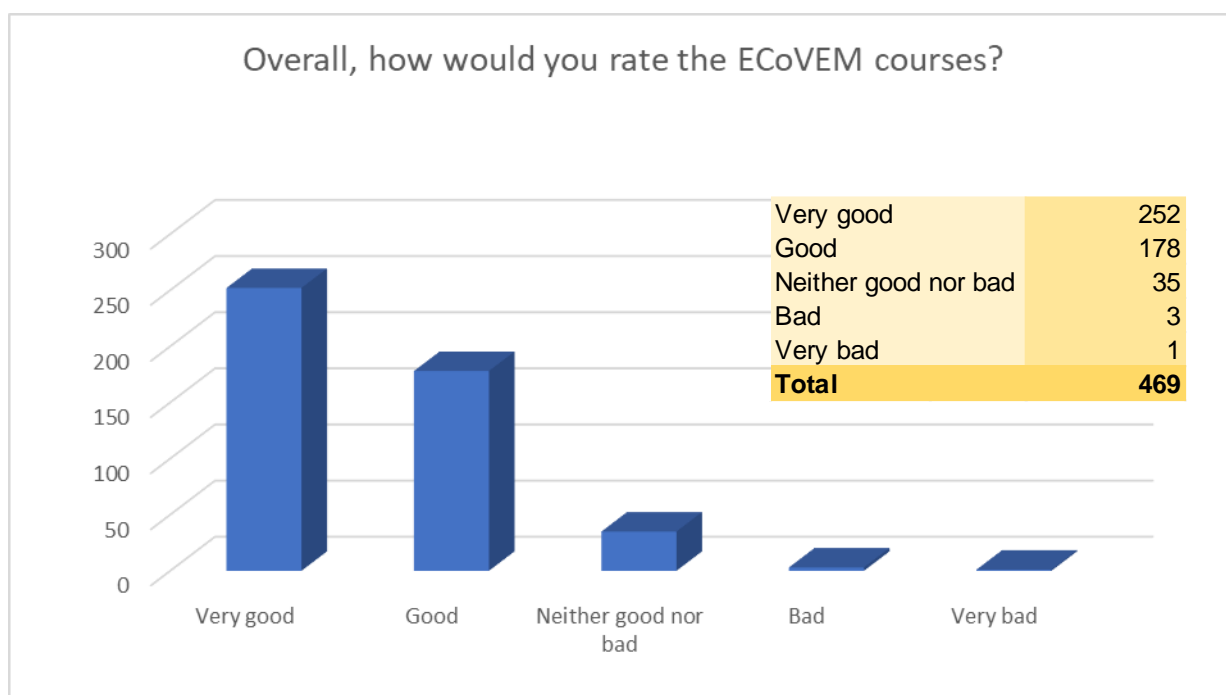
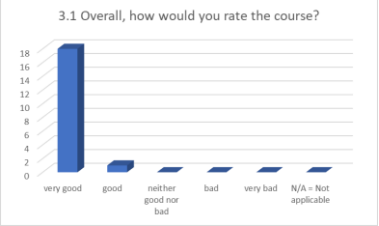
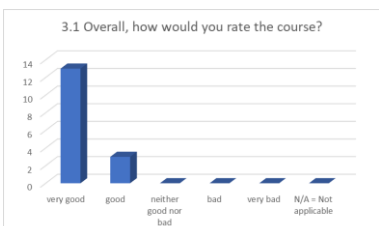
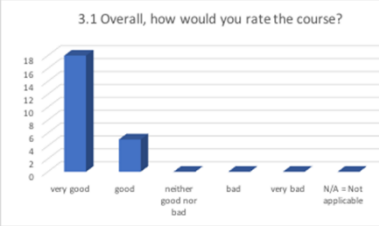
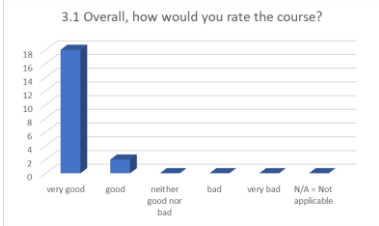
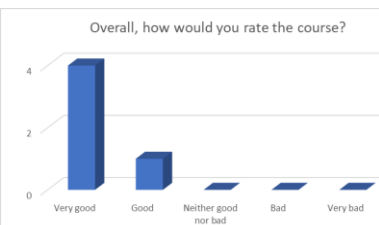
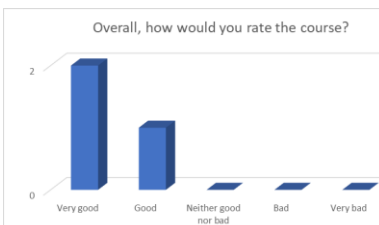

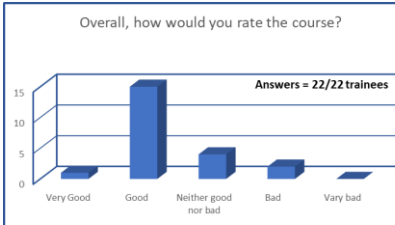
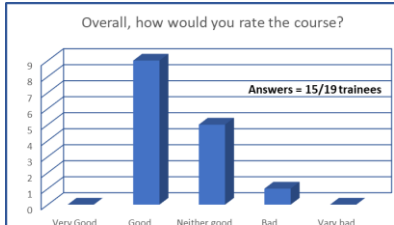


Figure 6: Satisfaction rate of ECoVEM trainees



Table 3 : Satisfaction rate of ECoVEM trainees for each individual course (referenced by its number – see Table 2)

<p><b>#1 (P01 TUS)</b></p> <p>3.1 Overall, how would you rate the course?</p> 	<p><b>#2 (P01 TUS)</b></p> <p>3.1 Overall, how would you rate the course?</p> 	<p><b>#3 (P01 TUS)</b></p> <p>Industrial confidentiality agreement</p>
<p><b>#4 (P01 TUS)</b></p> <p>3.1 Overall, how would you rate the course?</p> 	<p><b>#5 (P01 TUS)</b></p> <p>3.1 Overall, how would you rate the course?</p> 	<p><b>#6 (P01 TUS)</b></p> <p>Industrial confidentiality agreement</p>
<p><b>#7 (P01 TUS)</b></p> <p>Industrial confidentiality agreement</p>	<p><b>#8 (P01 TUS)</b></p> <p>Industrial confidentiality agreement</p>	<p><b>#9 (P01 TUS)</b></p> <p>Industrial confidentiality agreement</p>
<p><b>#10 (P03 SCAS)</b></p> <p>Overall, how would you rate the course?</p> 	<p><b>#11 (P03 SCAS)</b></p> <p>Overall, how would you rate the course?</p> 	<p><b>#12 (P05 J-ArtEck)</b></p> <p>The training content fulfills my expectation</p> 
<p><b>#13 – no metrics</b></p>	<p><b>#14 – no metrics</b></p>	<p><b>#15 – no metrics</b></p>
<p><b>#16 (P08 EXOLAUNCH)</b></p> <p><b>92%</b> “noting that they acquired valuable insights into the application of microelectronics in the space industry”</p>	<p><b>#17 (P08 EXOLAUNCH)</b></p> <p><b>96%</b> “stating they felt more confident in their presentation skills and pitching capabilities”.</p>	<p><b>#18 (P08 EXOLAUNCH)</b></p> <p><b>90%</b> “noting that they gained a deeper understanding of project management principles”.</p>
<p><b>#19 (P08 EXOLAUNCH)</b></p> <p><b>95%</b> “indicating they found the content valuable and relevant to their career aspirations”</p>	<p><b>#20 (P09 IAL FVG)</b></p> <p>Overall, how would you rate the course?</p> 	<p><b>#21 (P09 IAL FVG)</b></p> <p>Overall, how would you rate the course?</p> 



<p><b>#22 (P09 IAL FVG)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 8/10 trainees</p>	<p><b>#23 (P12 INES)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 59/133 trainees</p>	<p><b>#24 (P12 INES)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 31/37 trainees</p>
<p><b>#25 (P12 INES)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 25/31 trainees</p>	<p><b>#26 (P14 ANCCP)</b></p> <p>Overall, how would you rate the course?</p>	<p><b>#27 (P14 ANCCP)</b></p> <p>Overall, how would you rate the course?</p>
<p><b>#28 (P14 ANCCP)</b></p> <p>Overall, how would you rate the course?</p>	<p><b>#29 (P16 UNED)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 5/33 trainees</p>	<p><b>#30 (P16 UNED)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 6/20 trainees</p>
<p><b>#31 (P16 UNED)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 2/29 trainees</p>	<p><b>#32 (P16 UNED)</b></p> <p>0 students completed the course</p>	<p><b>#33 (P16 UNED)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 1/29 trainees</p>
<p><b>#34 (P16 UNED)</b></p> <p>Overall, how would you rate the course?</p> <p>Answers = 10/30 trainees</p>	<p><b>#35 (P16 UNED)</b></p> <p>0 students completed the course</p>	<p><b>#36 (P17 CPC)</b></p> <p>Overall how would you rate the course</p> <p>Answers = 24/24 trainees</p>





<p><b>#37 (P17 CPC)</b></p> <table border="1"> <thead> <tr> <th>Category</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Very Good</td> <td>14</td> </tr> <tr> <td>Good</td> <td>6</td> </tr> <tr> <td>Neither Good nor bad</td> <td>2</td> </tr> <tr> <td>Bad</td> <td>0</td> </tr> <tr> <td>Very Bad</td> <td>0</td> </tr> </tbody> </table>	Category	Count	Very Good	14	Good	6	Neither Good nor bad	2	Bad	0	Very Bad	0	<p><b>#38 (P21 ROMIT)</b></p> <p>3.1 Overall, how would you rate the course?</p> <table border="1"> <thead> <tr> <th></th> <th>Answers</th> <th>Ratio</th> </tr> </thead> <tbody> <tr> <td>very good</td> <td>3</td> <td>37.50 %</td> </tr> <tr> <td>good</td> <td>5</td> <td>62.50 %</td> </tr> <tr> <td>neither good nor bad</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>bad</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>very bad</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>N/A = Not applicable</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>No Answer</td> <td>0</td> <td>0.00 %</td> </tr> </tbody> </table>		Answers	Ratio	very good	3	37.50 %	good	5	62.50 %	neither good nor bad	0	0.00 %	bad	0	0.00 %	very bad	0	0.00 %	N/A = Not applicable	0	0.00 %	No Answer	0	0.00 %	<p><b>#39 (P21 ROMIT)</b></p> <p>3.1 Overall, how would you rate the course?</p> <table border="1"> <thead> <tr> <th></th> <th>Answers</th> <th>Ratio</th> </tr> </thead> <tbody> <tr> <td>very good</td> <td>3</td> <td>23.08 %</td> </tr> <tr> <td>good</td> <td>10</td> <td>76.92 %</td> </tr> <tr> <td>neither good nor bad</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>bad</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>very bad</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>N/A = Not applicable</td> <td>0</td> <td>0.00 %</td> </tr> <tr> <td>No Answer</td> <td>0</td> <td>0.00 %</td> </tr> </tbody> </table>		Answers	Ratio	very good	3	23.08 %	good	10	76.92 %	neither good nor bad	0	0.00 %	bad	0	0.00 %	very bad	0	0.00 %	N/A = Not applicable	0	0.00 %	No Answer	0	0.00 %												
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### 3.2 Summary of ECoVEM courses strengths and weaknesses

Each involved partner was asked to analyse the trainees’ and teachers’ surveys (see Annex I) and to summarize the strength of their courses as well as the area of improvements, thanks to the open questions of the satisfaction surveys.

Table 4 shows the **strengths of ECoVEM courses**, looking at individual courses or individual VET provider, thanks to the comments written by the trainees in the satisfaction surveys. Each course is specific of individual VET providers, their technical content, teaching methodologies, mode of delivery, etc... but a general trend can be highlighted:

- ✓ **Articulation between theory and practice**
- ✓ **Practical work and exercises are of great interest**
- ✓ **Project-based modules are very motivating**
- ✓ **Clarity, progressiveness, methodology and practical examples**
- ✓ **Trainers skills, knowledge, attentiveness and mastery**
- ✓ **Interactivity**
- ✓ **Up-to-date information, aligned with industry and market needs**
- ✓ **Materials, infographics, video tutorials and multimedia sources**



Table 4: Summary of the strengths of ECoVEM courses, looking at individual courses or individual VET provider.

<p><b>#1 (P01 TUS)</b></p> <ul style="list-style-type: none"> <li>✓ A lot of <b>practical work</b> makes the course more interesting</li> <li>✓ <b>Project-based modules</b> motivate as to learn because we feel like real engineers</li> <li>✓ At the end of the course we had working devices</li> <li>✓ <b>Interactivity</b></li> <li>✓ Group work on projects</li> <li>✓ The external links and <b>multimedia sources</b> are helping a lot to understand some of the concepts.</li> </ul>	<p><b>#2 (P01 TUS)</b></p> <ul style="list-style-type: none"> <li>✓ The topics are treated in a linear way and it is easy to use Xilinx ISE Design practically</li> <li>✓ it is interesting to understand how can program a processor</li> <li>✓ <b>Practice modules</b> are very useful - describe everything step by step with pictures</li> </ul>	<p><b>#4 (P01 TUS)</b></p> <ul style="list-style-type: none"> <li>✓ Hands-On <b>practical experience</b> with the bonding equipment</li> <li>✓ The course is <b>aligned with industry</b> demands</li> <li>✓ The <b>practical lab</b> work reinforces theoretical concepts and ensures that students have a solid foundation before moving on to more advanced packaging techniques.</li> <li>✓ Strong emphasis on <b>innovation</b></li> </ul>
<p><b>#10 - #11 (P03 SCAS)</b></p> <ul style="list-style-type: none"> <li>✓ The <b>schedule</b> of the different types of <b>practice</b> in the program;</li> <li>✓ <b>Understandable</b> language used;</li> </ul>	<p><b>#12 (P05 J-ArtEck)</b></p> <ul style="list-style-type: none"> <li>✓ <b>Materials</b></li> <li>✓ Our main <b>trainer</b> - Galina Shendrick and her communication with the trainees</li> <li>✓ <b>Clarity</b> and structure of the course</li> <li>✓ Engaging <b>practical exercises</b></li> </ul>	
<p><b>#16 (P08 EXOLAUNCH)</b></p> <ul style="list-style-type: none"> <li>✓ Gained <b>valuable insights</b> into the unique requirements and challenges of microelectronics in space.</li> <li>✓ <b>Improved knowledge</b> of the application of microelectronics in space technology.</li> <li>✓ Some participants expressed <b>interest in pursuing</b> further education or careers in the field of microelectronics for space applications</li> </ul> <p><b>"The 'Microelectronics for Space Applications' course was transformative. I feel more equipped to handle my projects."</b> – Nadine Smolka</p>	<p><b>#17 (P08 EXOLAUNCH)</b></p> <ul style="list-style-type: none"> <li>✓ <b>Substantial improvement</b> in presentation and public speaking skills.</li> <li>✓ Enhanced capability to create compelling and persuasive pitches.</li> <li>✓ <b>Participants showcased</b> their newly acquired skills in successful pitches and presentations.</li> </ul> <p><b>"Presentation Skills, Pitching has boosted my confidence immensely. The techniques taught are game-changers."</b> – Pablo Lobo</p>	<p><b>#18 (P08 EXOLAUNCH)</b></p> <ul style="list-style-type: none"> <li>✓ <b>Enhanced understanding</b> of key project management concepts and methodologies.</li> <li>✓ <b>Improved ability</b> to plan, execute, monitor, and control projects effectively.</li> <li>✓ <b>Greater confidence</b> in handling project-related responsibilities in professional roles</li> </ul> <p><b>"Navigating the complex world of project management felt daunting, but this course made it approachable and logical."</b> – Raoul Krell</p>



<p><b>#19 (P08 EXOLAUNCH)</b></p> <ul style="list-style-type: none"> <li>✓ Participants reported a significant <b>boost in their employability skills</b>, including resume building and interview techniques.</li> <li>✓ <b>Increased confidence</b> in job applications and interviews. Several participants successfully secured internships and entry-level positions following the program.</li> <li>✓ <b>"Understanding the labour market's intricacies is crucial. This course offered invaluable insights."</b> – Menelaos Filippitzi</li> </ul>	<p><b>#20 - #21 - #22 (P09 IAL FVG)</b></p> <ul style="list-style-type: none"> <li>- <b>Innovative content</b> also with respect to the soft skills development course "The Entrepreneurial Mindset for professional success"</li> <li>- <b>Clarity and practical examples</b></li> <li>- <b>Responsiveness to market needs</b></li> <li>- <b>Experienced professional</b> lecturers in youth education</li> </ul>
<p><b>#23 - #24 - #25 (P12 INES)</b></p> <ul style="list-style-type: none"> <li>✓ <b>Research lab guided tour</b></li> <li>✓ <b>Course material</b> - samples</li> <li>✓ Discovery and <b>deep understanding</b> of Photovoltaics manufacturing</li> <li>✓ <b>Trainer</b> skills / Knowledge, mastery</li> <li>✓ <b>Clarity, progressiveness</b></li> <li>✓ <b>Attentiveness, interactivity</b></li> <li>✓ <b>Up-to-date</b> information</li> </ul>	
<p><b>#26 - #27 - #28 (P14 ANCCP)</b></p> <ul style="list-style-type: none"> <li>✓ Web <b>structure, content and presentation</b> are well appreciated</li> <li>✓ <b>Short duration</b> was well appreciated.</li> <li>✓ The future official <b>VET accreditation</b>.</li> </ul>	
<p><b>#28 - #29 - #30 - #31 - #32 - #33 – #34 - #35 (P16 UNED)</b></p> <ul style="list-style-type: none"> <li>✓ The <b>materials and methods</b> are appropriate</li> <li>✓ Good presentation, <b>easy to follow</b></li> <li>✓ <b>really interesting, good trainer</b></li> <li>✓ I liked the <b>practical cases</b>, that help to understand the principles</li> <li>✓ Course organization in a <b>logical and progressive</b> manner. In addition, the videos and PDFs provided are very <b>clear and understandable</b>.</li> <li>✓ <b>Infographics</b></li> <li>✓ <b>Interesting practical approach</b></li> <li>✓ Very <b>good interface</b> and <b>practical training</b></li> <li>✓ "Good to learn about <b>Gender, equality and people integration</b> for improving my professional skills"</li> <li>✓ I liked that it showed the reality of gender inequality that exists in the world of work and how to confront it</li> <li>✓ It was <b>well structured</b>. The difficulty of the course progressed progressively with each module completed</li> <li>✓ "Continue with this amazing project !"</li> </ul>	



### #36 - #37 +TT01 (P17 CPC)

- ✓ The courses were **well organized** and according to their industrial or personal needs.
- ✓ The trainees were **extremely satisfied** with the training programme, with very little to no negative answers.
- ✓ The "**structure of training**" and the "**articulation between theory and practice**" were considered with positive evaluations respectively.
- ✓ The training on the various modules were developed through the combination of both classroom training and on hands, ensuring the extended participation of the judicial actors in the training activities, namely by allowing the conciliation of professional duties with the attendance of training sessions. Overall the chosen **methodology**, mainly **practice oriented**, with the discussion of case studies were extremely well received by participants, allowing them to expose their daily difficulties

### #38 - #39 - #40 - #41 (P21 ROMIT)

- ✓ A lot of **practical work** makes the course more interesting
- ✓ **Project-based modules** motivate as to learn because we feel like real engineers
- ✓ **Video tutorials** helps to prepare the project easier
- ✓ The external links and **multimedia sources** are helping a lot to understand some of the concepts.

### #42 (P21 ROMIT)

- The students are interested in developing **practical LoraWan modules and projects**.
- **Practice modules** are very useful - describe everything step by step with pictures

Table 5 shows the **areas for improvement of ECoVEM courses**, looking at individual courses or individual VET provider, thanks to the comments written by the trainees in the satisfaction surveys. Each course is specific of individual VET providers, their technical content, teaching methodologies, mode of delivery, etc... but a general trend can be highlighted:

- × **More practical work and projects for some of the courses**
- × **More time for learning, less condensed courses**
- × **Lack of self-assessment tests**
- × **More video tutorials**
- × **More specialization in AI**
- × **Interaction with students and practical evaluation for online courses**
- × **Somme bugs, errors, discrepancies**
- × **More internship opportunities**



Table 5: Summary of the areas of improvement of ECoVEM courses, looking at individual courses or individual VET provider.

<p><b>#1 (P01 TUS)</b></p> <ul style="list-style-type: none"> <li>× <b>More time</b> in laboratories</li> <li>× <b>Lack of self-assessment tests</b> after the theoretical modules</li> <li>× It is impossible to participate in the <b>practical work</b> in Bulgaria (from the foreign students following the course <b>on-line</b>)</li> </ul>	<p><b>#2 (P01 TUS)</b></p> <ul style="list-style-type: none"> <li>× Add <b>more videos</b> (students following the course <b>on-line</b>)</li> </ul>	<p><b>#4 (P01 TUS)</b></p> <ul style="list-style-type: none"> <li>× Continuation of industry collaboration in order the course curriculum to remain aligned with the latest industry advancements and requirements.</li> <li>× <b>Need of more complex equipment</b> for implementation of MCM</li> <li>× <b>More internship opportunities</b></li> </ul>
<p><b>#10 - #11 (P03 SCAS)</b></p> <ul style="list-style-type: none"> <li>× AI part of course is <b>too basic</b>;</li> <li>× For the future, <b>more interactive elements</b> could be incorporated;</li> <li>× <b>Some bugs</b> were addressed during the testing</li> </ul>	<p><b>#12 (P05 J-ArtEck)</b></p> <ul style="list-style-type: none"> <li>× <b>Organization</b> – during the pilot test we definitely could make it better according to timing and the organiser's communication</li> <li>× <b>Content</b> – maybe it is a great idea to add some latest information and digital materials</li> <li>× <b>Trainers</b> – we need really motivated professionals to build up a trainer team</li> </ul>	
<p><b>#20 - #21 - #22 (P09 IAL FVG)</b></p> <ul style="list-style-type: none"> <li>× <b>Increased training hours</b></li> <li>× Inclusion of a <b>support laboratory technician</b> in the staff</li> <li>× Due to their young age, IAL FVG users find it difficult to include personal considerations in surveys.</li> </ul>		
<p><b>#23 - #24 - #25 (P12 INES)</b></p> <ul style="list-style-type: none"> <li>× <b>Condensed courses</b>, lack of time</li> <li>× <b>Lack of summary</b> with essential points</li> <li>× <b>Lack of practical work</b>, too much theory</li> <li>× <b>Readability</b> of the slides</li> </ul>		
<p><b>#26 - #27 - #28 (P14 ANCCP)</b></p> <ul style="list-style-type: none"> <li>× Students more experimented detected <b>some errors/discrepancies</b> with their own calculations. Sometimes data is missing in exercises, and theory and practice have discrepancies.</li> <li>× We are in dependence to the external software, from UNED</li> </ul>		



<p><b>#28 - #29 - #30 - #31 - #32 - #33 – #34 - #35 (P16 UNED)</b></p> <ul style="list-style-type: none"> <li>× Maybe <b>include Tutorial videos</b></li> <li>× To have some <b>real experience</b> online of the circuits, some real specification components</li> <li>× To <b>add open questions</b> to make student think and later give answers</li> <li>× Regarding the contents, I missed some <b>more information about IA</b>, something that is at the moment becoming an important tool</li> <li>× <b>Interaction with students</b> could be improved, although I liked the course overall</li> <li>× Not disliking themselves, but personally I am not able to use the podcast to study</li> <li>× <b>Interaction with students</b> and <b>practical evaluation</b> of the course could be improved. Although I liked the course in general terms</li> <li>× The course was in English</li> <li>× It would be interesting to introduce <b>interviews with professionals</b> in the sector talking about how these issues are addressed in their companies</li> <li>× Some difficulty to understand some <b>acronym</b></li> <li>× I would like <b>more open books</b></li> </ul>	
<p><b>#38 (P21 ROMIT)</b></p> <ul style="list-style-type: none"> <li>× <b>More time</b> in doing <b>projects</b></li> <li>× <b>Lack of self-assessment tests</b> after the theoretical modules</li> </ul>	
<p><b>#39 - #40 - #41 (P21 ROMIT)</b></p> <ul style="list-style-type: none"> <li>× More <b>internship opportunities</b></li> </ul>	<p><b>#42 (P21 ROMIT)</b></p> <ul style="list-style-type: none"> <li>× The course has <b>too much theoretical lessons</b> due to the nature of long range IoT communications</li> </ul>

### 3.3 Expected improvements for Field Trial

Thanks to the analysis of the satisfaction surveys, each partner proposed actions to be implemented in order to improve their trainings during the Filed Trial phase (see Table 6)

These actions include:

- ✓ **Design and incorporation of new modules, including practical works and projects**
- ✓ **Expansion and improvement of lab facilities + material**
- ✓ **Special project or practical work for online courses**
- ✓ **Update information, improve presentations, fix bugs and errors**
- ✓ **Add some new technical areas, like Artificial Intelligence**
- ✓ **Increase (or shorten) course duration**
- ✓ **Inclusion of self-assessment tests**
- ✓ **Incorporate new trainers or increase teachers' involvement**



Table 6: Actions to be implemented by VET providers to improve their courses for the Field Trial phase

<p><b>P01 TUS</b></p> <ul style="list-style-type: none"> <li>✓ <b>Self-assessment test</b> for the theoretical part of the courses will be developed for the field trial.</li> <li>✓ <b>Special projects assignments</b> will be designed <b>for the foreign students</b> for PCB design and autonomous packaging. The design and the photo of the PCB will be sent for assessment to the teacher/tutor.</li> <li>✓ <b>Expansion and improvement of lab facilities</b>, including the acquisition of the new bonding equipment.</li> <li>✓ Encouragement and support for students to engage in <b>research projects</b>, fostering innovation and contributing to advancements in microelectronics packaging.</li> </ul>	<p><b>P03 SCAS</b></p> <ul style="list-style-type: none"> <li>✓ As mentioned above, students found some <b>broken links</b> in the courses that were quickly fixed;</li> <li>✓ We also <b>improved the interface</b> of the platform a bit to be less confusing.</li> </ul>
<p><b>P08 EXOLAUNCH</b></p> <ul style="list-style-type: none"> <li>✓ Feedback suggests incorporating <b>more real-world examples</b> in the "Survival in the Labor Market" course. Plans are underway to integrate this in the next iteration.</li> </ul>	<p><b>P05 J-ArtEck</b></p> <ul style="list-style-type: none"> <li>✓ <b>Actualize data</b> and include <b>digital materials</b></li> <li>✓ Try to incorporate <b>new trainers</b></li> </ul> <p><b>P09 IAL FVG</b></p> <ul style="list-style-type: none"> <li>✓ <b>Increased course length</b> with the inclusion of LARSA (extra-curricular enhancement modules)</li> <li>✓ <b>Reintroduction and enhancement of the course "Entrepreneurial Mindset"</b></li> <li>✓ Provision of <b>individual study material</b> for the learner to use at home</li> <li>✓ Evaluation of the incorporation of a <b>laboratory technician</b> for specialist support.</li> </ul>
<p><b>P12 INES</b></p> <ul style="list-style-type: none"> <li>✓ <b>Less condensed content</b> and/or <b>increase the duration</b> of the course</li> <li>✓ Design of a new PV demonstrator for the <b>implementation of practical work</b>: Cabling, electricity basics, safety... (<b>course #23</b> – EQF 5-6)</li> <li>✓ <b>Implementation of practical work</b> on PV module defects detection and measurements (<b>course #25</b> – EQF 7-8)</li> <li>✓ At the end of the training, <b>additional exercise</b> with students to list the <b>essential points</b> of the course</li> <li>✓ Lightening and <b>readability</b> of the slides</li> </ul>	<p><b>P14 ANCCP</b></p> <ul style="list-style-type: none"> <li>✓ Some more <b>theoretical approach</b> and some <b>practical application</b>.</li> <li>✓ We are working on <b>official accreditation</b> process, but is a long way due to is a new process related to the new national VET law in development phase.</li> </ul> <p>We started with the <b>Spanish translations</b>, but we have no budget in the project for it and it depends on our own financing and teacher time and dedication.</p>



<p><b>P16 UNED</b></p> <ul style="list-style-type: none"> <li>✓ We <b>updated</b> in some of the courses (i.e., Task-oriented simulation with OrCAD Pspice): the <b>Tutorials</b> of the software tools used in the course were modified to provide more information to the student regarding this practical work. Those tutorials were <b>included from the beginning in other courses</b> (like in Foundations and Simulations on FPGAs)</li> <li>✓ As we added in some of the courses <b>real experiments</b> (with <b>remote laboratories</b>, like in the course Foundations on Microelectronics, or with the use of <b>external hardware</b>, in the course Foundations and Simulations on FPGAs or like in the courses from ANCCP) we tried to maximize the real knowledge and competences/skills of the students</li> <li>✓ We will <b>review</b> during the last year of the project (since November 2023 to October 2024) the <b>acronyms definitions</b> on the courses (we included now in some of them, like in the course Basics of Microelectronics Manufacturing Processes) as well as the possibility to <b>include real specifications of some of the electronics and microelectronics components</b> used there</li> <li>✓ If feasible, we will try to <b>add some new technical areas, like Artificial Intelligence</b>, but those will be covered by other courses of the ECoVEM project</li> <li>✓ Online tutored courses need the availability of more teaching and human resources but might try to have in some cases <b>more teaching involvement in the online interaction with the students</b></li> </ul>	
<p><b>P17 CPC</b></p> <ul style="list-style-type: none"> <li>✓ The course <b>TT01</b>, train the trainers was rather short in length, and should be at least, <b>minimum 40-50 hours</b></li> <li>✓ <b>More practical work</b> is required for TT01, (i.e. to design courses, implementation and case studies)</li> <li>✓ The period of application of the courses was inconvenient, better <b>to be carried out on afternoon or electronically</b></li> <li>✓ <b>Shorter classes</b> are preferred for the pilot courses <b>#36 and #37</b>.</li> <li>✓ <b>More practical work</b> is required for courses <b>#36 and #37</b>.</li> <li>✓ Try to <b>incorporate specialist work trainer</b> for specific tasks.</li> </ul>	<p><b>P21 ROMIT</b></p> <ul style="list-style-type: none"> <li>✓ <b>Course #39:</b> Add <b>2 new modules</b> for ARM architecture and Systems on Chips (SoC)</li> <li>✓ <b>Course #40:</b> Add <b>1 new module</b> for PV inverter simulation</li> <li>✓ <b>Course #41:</b> Add <b>1 new practical module</b></li> <li>✓ <b>Course #42:</b> Add <b>one more project module</b> for developing of LoraWan sensor node</li> <li>✓ More <b>internship opportunities</b></li> </ul>





## 4 Conclusion

The analysis of Pilot Test phase through this intermediate report allows to provide **feedback and recommendations** to VET providers and partners in order to improve the quality and implementation of ECoVEM courses **before Field Trial start**, which is scheduled to begin on M36 (November 2023).

Furthermore, it highlights that the Pilot Test **met all the quantitative and qualitative targets** set out in the ECoVEM project grant agreement. A rigorous methodology has been implemented in order to **evaluate** the success of the Pilot Test and identify areas for improvement in preparation for the Field Trial phase

To date, **946 trainees have registered** for one of the **42 main courses** developed for **initial and continuous VET** and **701 trainees completed** their corresponding pilot test course. An even distribution between modes of delivery has been proposed: **14 on-site/face-to-face trainings, 13 online trainings and 15 hybrid trainings**, allowing for great versatility for the trainees to attend the courses. These trainings can be categorized in **7 main course categories** and each **module-based** course can be adapted to **various EQF levels**, providing flexibility for the trainees to select the appropriate training and acquire a wide range of skills and knowledge according to suitable learning outcomes. Thereby, the **EQF balance** is met and **largely exceeded expectations**, with on top of that a **high satisfaction rate**:

- ✓ 86 trainees completed courses of EQF level 3
- ✓ 70 trainees completed courses of EQF level 4
- ✓ 107 trainees completed courses of EQF level 5
- ✓ 264 trainees completed courses of EQF level 6
- ✓ 147 trainees completed courses of EQF level 7
- ✓ 27 trainees completed courses of EQF level 8

The **gender distribution** follows what is generally observed in the Science and Technology sector, and especially in Microelectronics, with a share of **76% men and 23% women**, although differences were highlighted from one country to another: therefore, collaborative work is and will be engaged in order to foster the attractiveness of Microelectronics jobs for women. Besides, although a high number of **43 nationalities** has been reached by ECoVEM courses, efforts must be done during Field Trial phase to **foster intra-European mobility** within partner's network.

Thanks to the open questions of the satisfaction surveys and exchanges with teachers, the Pilot Test **highlighted the strengths** of the ECoVEM partners' courses (depending on partners, but mainly the quality of the trainers' skills, the practical and project-based works, clarity, up-to-date information, appropriate materials and interactivity, etc.) and the **areas for improvement** (such as even more practical work and projects, more interactions for online courses, more time and less condensed courses, etc.).

Although the high satisfaction rate already proves the high standard of ECoVEM courses, **each partner has carried out an analysis of its pilot test in order to implement actions aimed at continuously improving their training** for the field trial phase, which is now starting.