

DETECT 2.0

Summary of Gaps in HEI and VET Education Programmes

Deliverable 4.2 · v1.0 final version

30 September 2026

OUTPUT SUMMARY Project information	
Project Title	Deep Tech Competence Enhancement for Digital Transition in Dementia Care
Project Acronym	DETECT 2.0
Starting date	1 November 2025
End Date	31 October 2028
Website	https://detect20.ipn.pt/
Deliverable Title	Summary of Gaps in HEI and VET Education Programmes
Deliverable number	D4.2
Work Package	WP 4
WP leader	Jordi Linares-Pellicer (UPV)
Date of delivery	30 September 2026 (due 30/09/2026, M11)

DETECT 2.0 project is funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Document Control

Project	DETECT 2.0 — Deep Tech Competence Enhancement for Digital Transition in Dementia Care
Project acronym	DETECT 2.0
Grant agreement no.	101246390 — ERASMUS-EDU-2025-PI-ALL-INNO
Work Package	WP4 — Modernizing and developing education and training for new AI skills in healthcare
Deliverable	Deliverable 4.2 — Summary of Gaps in HEI and VET Education Programmes
Lead beneficiary	UPV (Universitat Politècnica de València)
Contributing partners	Tredu / City of Tampere (co-coordination), LAB, Vision Factory, Avans, Curio, IPN, Macomi, 't Heem
Authors	Jordi Linares-Pellicer, Isabel Ferri-Mollá (UPV)
Dissemination level	Public (PU) · Type R · Milestone 5
Due date	30/09/2026 (M11)
Submission date	30/09/2026 (v1.0 final version)

Table of Contents

Executive Summary *7*

1. Context and methodology *11*

1.1 The DETECT 2.0 project and Work Package 4 11

1.2 Task 4.2 and the scope of this deliverable 12

1.3 Policy and demographic context 13

1.4 Methodology 15

1.5 Status of this version and validation record 16

1.6 Limitations 16

2. Recap of D4.1 findings (Task 4.1) *18*

2.1 Survey design and sample 18

2.2 Headline quantitative findings 19

2.3 Cross-segment analysis 21

2.4 Qualitative findings 22

2.5 Peer-reviewed synthesis and what D4.2 adds 23

3. Competence map: knowledge, skills and attitudes *24*

3.1 How the map was built and how to read it 24

3.2 Area 1 — Utilisation of AI-based assistive technology 25

3.3 Area 2 — Development of innovations 26

3.4 Area 3 — Entrepreneurship 27

3.5 Area 4 — Sustainability related to healthcare and technology 28

3.6 Area 5 — Digital literacy and readiness 29

3.7 Reading the map across levels and tracks 29

4. Country gap analysis: Finland, Spain, the Netherlands, Portugal *31*

4.1 Finland 31

4.2 Spain 32

4.3 The Netherlands 33

4.4 Portugal 35

4.5 Industry validation status (Step A) 35

5. Cross-cutting gaps and the European benchmark (EQF 5–7) *37*

5.1 Benchmarking approach 37

5.2 The European reference picture 38

5.3 Seven cross-cutting gaps 40

5.4 The European gaps matrix 42

6. Response framework *44*

6.1 Design principles 44
6.2 Six response lines 44
6.3 Hand-off to T4.3 and T4.4 46
7. Implications for WP3 and WP5 47
7.1 Implications for WP3 (hackathons and piloting) 47
7.2 Implications for WP5 (dissemination) and quality assurance 47
8. Conclusions and next steps 48
References 50
Annexes 55
Annex A D4.1 survey instrument and sample summary 55
Annex B European reference programmes: consolidated starter list 56
Annex C Step A industry validation: record and written validation track 57
Annex D KPI compliance status 60
Annex E Record of the September 2026 partner review 60
Annex F Glossary and abbreviations 62

Table of Figures

Figure 1. Headline results of the D4.1 survey (n = 34). Source: D4.1 dataset, recomputed (Annex A). 8

Figure 2. The WP4 pipeline: from curricula analysis (T4.1) to digital materials (T4.4), with hand-offs to WP2, WP3 and WP5. 12

Figure 3. Demographic pressure and the European policy frame converging on DETECT 2.0 WP4....14

Figure 4. Distribution of AI-based assistive technology content and dementia-care application across the 34 surveyed programmes. Source: D4.1 dataset (Q8, Q9). 21

Figure 5. Four-way segmentation of the D4.1 sample: mirror-image deficits between care and technical education. Source: D4.1 dataset; segmentation as in Komssi, Pöntiö & Ferri-Mollá (2026)....22

Figure 6. The competence map at a glance: 61 entries across the five thematic areas, and one progression from operational to design competence shared by both tracks. Source: Tables 4 to 8. 25

Figure 7. From the four country readings through the European benchmark (EQF 5–7) to the gaps matrix. The gap codes G1–G7 are explained in detail in Section 5.3. 38

Figure 8. The seven cross-cutting gaps (G1–G7) with headline evidence. Source: D4.1 and Section 5. 42

Figure 9. The six response lines mapped to gaps and WP4 outputs....46

Figure 10. The path to submission: partner review, freeze, presentation in Breda and submission to EACEA (Month 11, Milestone 5)....49

Figure 11. The benchmark at a glance: the near-empty MCI/dementia column and the absent sustainability column are the void DETECT 2.0 addresses. Source: Table 15. ..57

Executive Summary

This deliverable presents the consolidated summary of gaps in Higher Education Institution (HEI) and Vocational Education and Training (VET) programmes at the intersection of artificial intelligence (AI), digital competences and the care of people with mild cognitive impairment (MCI) or early-stage dementia.

It is the second output of Work Package 4 (WP4) of the DETECT 2.0 project and corresponds to Task 4.2 of the Grant Agreement. It builds directly on Deliverable D4.1 (Curricula Analysis, April 2026), extends its findings through working-life validation via the WP2 innovation ecosystem camps (Step A) and through a European benchmarking of educational offerings at EQF levels 5 to 7 (Step B), and condenses the result into a European gaps matrix that will steer the next WP4 tasks: T4.3 (preliminary drafts of updated curricula) and T4.4 (development of digital educational materials).

In one paragraph. D4.2 answers two questions: which competences the AI-supported care of people with MCI or early-stage dementia requires from future healthcare and ICT professionals, and how far current European education is from providing them. It starts from the evidence WP4 already owns (the D4.1 survey and its peer-reviewed analysis), validates it against the working-life perspective of the WP2 ecosystem, benchmarks it against European provision at EQF 5 to 7, and closes with the action frame that T4.3 and T4.4 will execute.

The evidence base is the D4.1 survey of 34 educators and programme coordinators from consortium institutions in Finland, Spain and the Netherlands, complemented by the qualitative material collected in the same exercise, by the first WP2 needs camp held on 2 June 2026, and by desk research on European frameworks and reference programmes. The survey findings are stark. 82.4% of the surveyed programmes have either no content on AI-based assistive technology or only superficial coverage; 70.6% contain no dementia-specific content; 64.7% of educators are not, or only slightly, confident that their graduates can use AI-driven tools effectively and responsibly; 82.4% of programmes include no novel development projects for students; and the mean sustainability integration score is 2.2 on a five-point scale. The analysis behind these figures has been peer-reviewed and published in the LAB RDI Journal in August 2026, which strengthens the evidential standing of this deliverable; every figure quoted in this document was recomputed from the raw survey dataset for this version (Annex A). Figure 1 summarises these headline findings.



Figure 1. Headline results of the D4.1 survey (n = 34). Source: D4.1 dataset, recomputed (Annex A).

The core analytical contribution of D4.2 is twofold. **First**, a competence map organises what future healthcare and ICT professionals need to know, be able to do, and be disposed to do, across the five thematic areas inherited from Task 4.1: utilisation of AI-based assistive technology, development of innovations, entrepreneurship, sustainability related to healthcare and technology, and digital literacy and readiness. Every entry is referenced to an EQF level (5, 6 or 7, with EQF 4 noted where VET continuity requires it) and to the HEI or VET track, and carries an explicit derivation trace back to the D4.1 evidence, the needs camp and the European frameworks (Section 3.1). **Second**, a set of seven cross-cutting gaps, each traceable to the D4.1 dataset and checked against the European reference picture, is consolidated into a European gaps matrix that classifies each gap by thematic area, EQF level, affected track, severity and the DETECT 2.0 response that will address it.

The seven cross-cutting gaps can be stated plainly. **AI fundamentals are largely absent from healthcare curricula**, and no programme teaches them in depth. Dementia-specific application of AI is missing in seven programmes out of ten and in every ICT programme. Educators lack AI expertise and structured professional development, and most doubt their graduates' AI readiness, which makes **the teacher, rather than the student, the first bottleneck**. Ethics, data protection and sustainability are taught in the abstract, when they are taught at all, rather than in clinical context. Innovation practice and entrepreneurial exposure are detached from care education. **Healthcare and ICT provision run in parallel silos with very little interdisciplinary teaching**. Finally, current programmes are not yet aligned with the European frameworks and legal duties that now

apply, including the **AI literacy obligation of Article 4 of the EU AI Act**, in force for providers and deployers since 2 February 2025.

In response, the deliverable proposes a framework of **six response lines**:

- A train-the-trainer programme differentiated for VET and HEI educators
- Modular AI and MCI curriculum units designed for flexible integration
- Cross-domain integration labs where healthcare and ICT students collaborate
- Multilingual open educational resources with AI-assisted delivery
- Entrepreneurship and innovation methods embedded inside health technology modules
- Ethics with sustainability treated as a transversal design requirement of every unit.

Each line is mapped to the gaps it addresses and to the WP4 key performance indicators it serves, principally the five updated curricula and the forty digital educational materials.

D4.2 at a glance. *34 programmes surveyed in D4.1 ·* ***82.4%*** *with no or superficial AI ·* ***70.6%*** *without dementia content ·* ***61 competences*** *mapped across five areas ·* ***13 European programmes*** *benchmarked in 8 countries ·* ***7 cross-cutting gaps*** *·* ***6 response lines*** *· and one cell empty across Europe:* ***no programme combines AI competence with MCI and dementia care****.*

How this document is organised. Section 1 sets the context and the method. Section 2 recaps the D4.1 evidence. Section 3 presents the competence map, the deliverable's core artefact. Section 4 reads the four partner countries against it. Section 5 adds the European benchmark and consolidates everything into seven gaps and the gaps matrix. Section 6 defines the six response lines, and Section 7 connects them to WP3 and WP5. Section 8 closes with the conclusions and the next steps. The annexes carry the evidence detail, the Step A record and the record of the partner review.

This is the final version (v1.0) of the deliverable, prepared by UPV as WP4 lead from the evidence the work package owns and closed after the partner review of September 2026 and the Annual Partner Meeting in Breda (22–23 September 2026). The country sections for Finland, the Netherlands and Portugal were drafted by UPV from the D4.1 dataset and public documentation; the Finnish section was confirmed by LAB on 14 September 2026 and the Dutch VET reading by Curio on 21 September 2026; the consortium's working-life partners, 't Heem and Macomi, read the gaps and the response framework from their practice and recognised them (Section 4.5, Annex C).

Step A, the industry validation, is closed on three sources: the material of the first WP2 needs camp (2 June 2026), the partner review of September 2026, which includes the written reflections of the working-life partners, and the plenary discussion at the Breda

meeting. The written validation form annexed to this document was not circulated before the freeze; with Vision Factory's agreement of 23 September 2026 it is carried over to the validation of the T4.3 curricula drafts at the next ecosystem camp.

This final version is submitted to EACEA on 30 September 2026 (Month 11) and closes Milestone 5 of the project.

1. Context and methodology

1.1 The DETECT 2.0 project and Work Package 4

DETECT 2.0 (Deep Tech Competence Enhancement for Digital Transition in Dementia Care) is an Erasmus+ Alliances for Innovation project (Grant Agreement No. 101246390, call ERASMUS-EDU-2025-PI-ALL-INNO) that brings together nine partner organisations from four European countries: LAB University of Applied Sciences (Finland, coordinator), Tredu / City of Tampere (Finland), Vision Factory (Finland), Universitat Politècnica de València (Spain), Avans University of Applied Sciences (Netherlands), Curio (Netherlands), Macomi (Netherlands), 't Heem (Netherlands) and Instituto Pedro Nunes (Portugal). The project runs from 1 November 2025 to 31 October 2028. Its purpose is to enhance deep tech competences in healthcare and ICT education, with a particular focus on AI applications that support people with MCI and early-stage dementia and the professionals who care for them.

Work Package 4, "Modernizing and developing education and training related to AI skills in healthcare", is led by UPV and contributes directly to the project's General Goal 2 (GO2): to enhance the AI skills, innovation capacity and entrepreneurial mindset of the future healthcare and ICT workforce.

The work package runs from Month 3 to Month 34 and is organised as an iterative curriculum development pipeline: **T4.1** analysed the current curricula of the partner institutions**; T4.2** (this deliverable) consolidates and validates the gaps and benchmarks them at European level; **T4.3** will prepare preliminary drafts of updated curricula; **T4.4** will develop digital educational materials; and **T4.5** will publish them in an open online library with AI-assisted delivery.

The WP4 key performance indicators include one summary of gaps in HEI and VET education programmes in Europe (this document), five updated curricula, forty digital educational materials, one digital library, and an 80% target for improved skills among hackathon participants measured through pre- and post-surveys. Figure 2 shows the WP4 pipeline and its hand-offs to the other work packages.

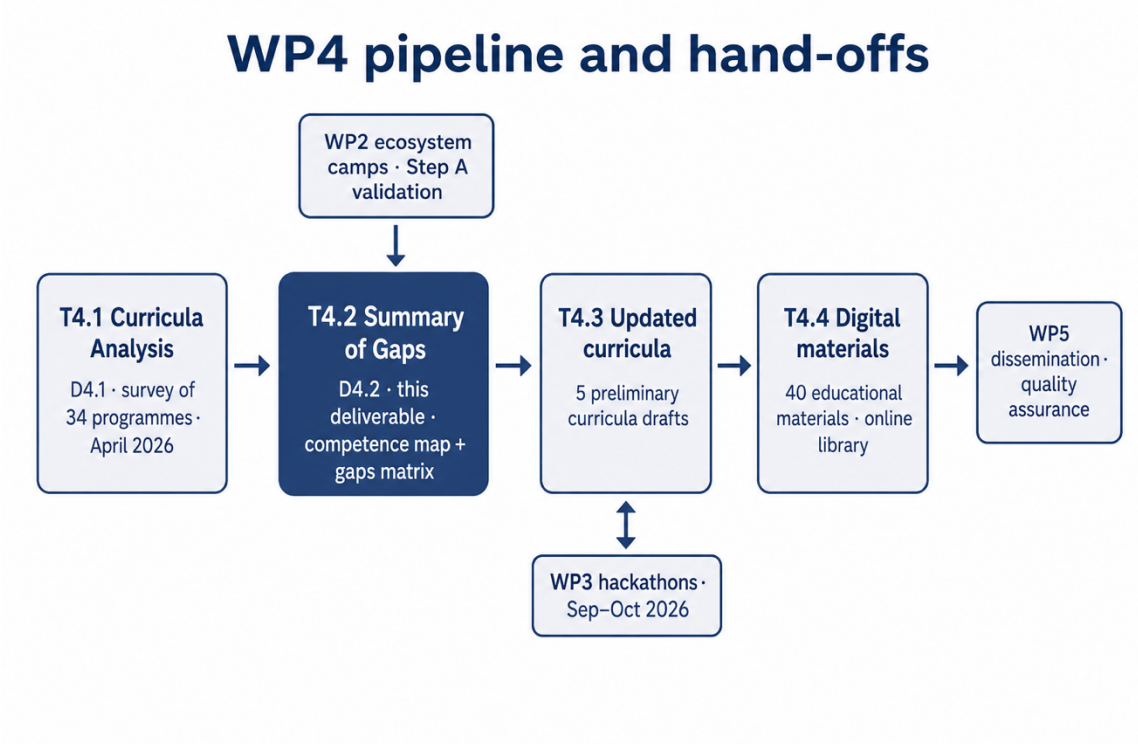


Figure 2. The WP4 pipeline: from curricula analysis (T4.1) to digital materials (T4.4), with hand-offs to WP2, WP3 and WP5.

1.2 Task 4.2 and the scope of this deliverable

The Grant Agreement describes Task 4.2 as follows: the T4.1 summary is discussed with the innovation ecosystem actors convened in WP2 (Task 2.2) to understand in what terms existing education programmes fall short of the AI-related skills and competencies needed in working life; the next step is to benchmark HEI and VET educational offerings at European level across the same thematic areas, with UPV preparing a summary comparison of competence requirements in European educational offerings at EQF levels 5 to 7. The gap analysis assesses how well current programmes in partner organisations equip students and professionals to develop and use AI-based technology in support of people with MCI or early-stage dementia, and identifies the areas where education needs to be developed.

Deliverable **D4.2**, "**Summary of Gaps in HEI and VET Education Programmes**", is due at Month 11 (30 September 2026). It is a public report (Type R, dissemination level PU) and it constitutes the evidence for Milestone 5 of the project, "Curricula analysis and gaps identified in current education programmes in HEI and VET ready".

Its operational objectives are: **(1)** to consolidate the gaps identified in D4.1 into a single structured European picture; **(2)** to validate those gaps against the working-life perspective gathered through the WP2 T2.2 camps; **(3)** to benchmark the competence requirements of partner-country programmes against a broader set of European educational offerings at EQF 5 to 7; **(4)** to identify the priority areas where DETECT 2.0 can

act and feed them into T4.3 and T4.4; and **(5)** to satisfy the Erasmus+ reporting requirements for a public deliverable.

Two scope clarifications apply. **First, the Grant Agreement** frames the comparison of healthcare professional education programmes across EQF levels 4 to 7, while the internal WP4 proposal concentrates the European benchmark at EQF 5 to 7, where cross-country comparability is highest. Both readings are compatible and both are honoured here: the analysis covers the full EQF 4 to 7 range found in the partner institutions, and the European benchmark of Section 5 concentrates on EQF 5 to 7. **Second**, the five thematic areas inherited from Task 4.1 frame the entire analysis: (i) utilisation of AI-based assistive technology, (ii) development of innovations, (iii) entrepreneurship, (iv) sustainability related to healthcare and technology, and (v) digital literacy and readiness.

1.3 Policy and demographic context

The demographic pressure is well documented. Alzheimer Europe estimates that around **9.1 million people were living with dementia** in the EU27 in 2025, and about 12.1 million across the wider European region; on current projections the EU27 figure will rise to roughly **14.3 million by 2050** (Alzheimer Europe, 2025). **Women** are disproportionately affected, both as patients and as carers. **Diagnosis remains late**: the mean time between first noticed problems and diagnosis can reach 2.1 years in Europe (European Brain Council, 2023), and the World Alzheimer Report found that 62% of healthcare practitioners worldwide still consider dementia a normal part of ageing (Alzheimer's Disease International, 2019). Late recognition narrows the window in which support is most effective. Figure 3 sets this pressure against the policy frame described below.

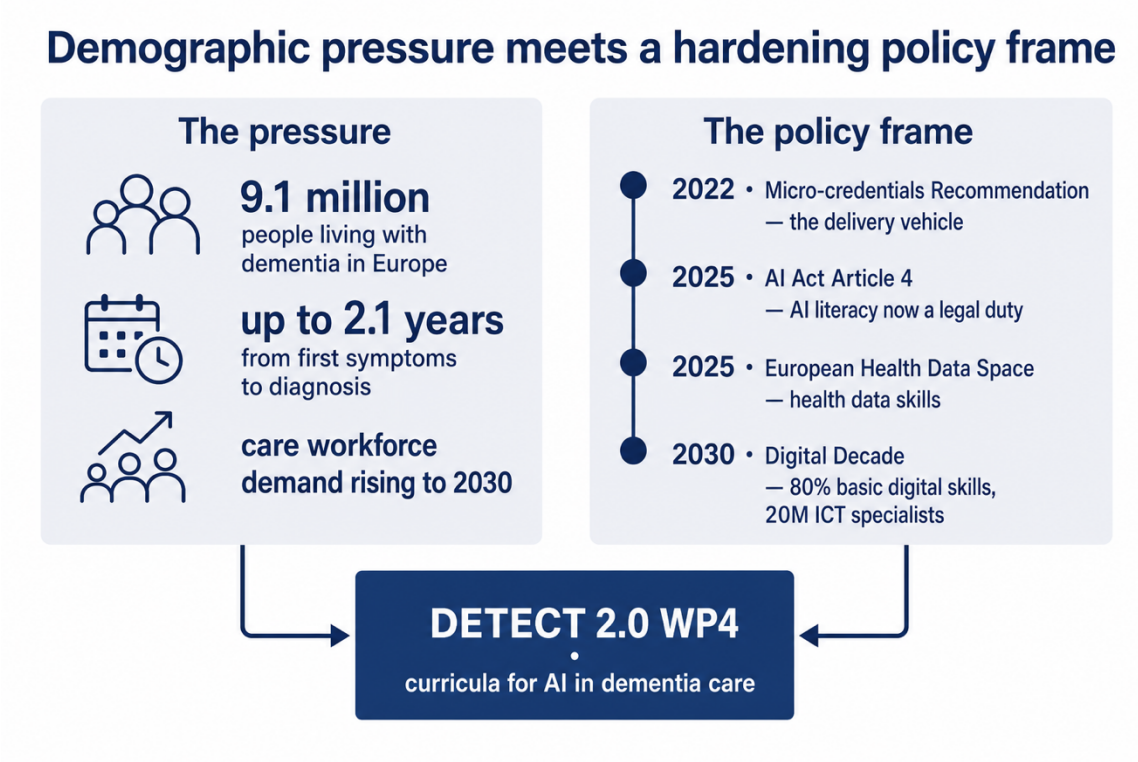


Figure 3. Demographic pressure and the European policy frame converging on DETECT 2.0 WP4.

AI-based assistive technologies address exactly this window. Machine learning models and AI agents can detect early cognitive decline from speech and behavioural patterns, sensor systems can support independent living, and AI-enabled tools can relieve documentation and monitoring workload for nurses, physiotherapists and care assistants (Ienca et al., 2017; Kale et al., 2024). None of this reaches practice through technology alone. Nurses and other caregivers frequently lack the training to use AI effectively (Sorrentino et al., 2024; Ruksakulpiwat et al., 2024), **61% of European health professionals report never having received dedicated digital skills** training (HealthyEurope, 2024), and over **half of surveyed health students rate their own eHealth skills as poor** (Machleid et al., 2020). The skills gap widens as adoption outpaces training (Sidhu et al., 2024).

The European policy frame has hardened considerably since the project was designed, and it now works in DETECT 2.0's favour:

- **Article 4 of the EU AI Act** (Regulation (EU) 2024/1689) **obliges** providers and deployers of AI systems to **ensure a sufficient level of AI literacy in their staff**, an obligation applicable since 2 February 2025; care organisations that deploy AI-based assistive technology fall squarely within it.
- **The European Health Data Space Regulation** (EU) 2025/327 creates duties and opportunities around health data use that presuppose data-literate professionals.
- **The Digital Decade policy programme** (Decision (EU) 2022/2481) sets the 2030 targets of at least 80% of adults with basic digital skills and 20 million ICT specialists in the EU.

- **The Council Recommendation of 16 June 2022** on micro-credentials provides the delivery vehicle that WP4 intends to use for modular upskilling.
- **EIT Deep Tech Talent Initiative**, which reported one million people trained in deep tech fields by mid-2025, shows both the scale of the European effort and the space DETECT 2.0 occupies within it: deep tech competence applied to dementia care, a niche no other initiative covers with this specificity.

---

*For education this translates into a simple statement of demand. **Health and care curricula** must produce graduates who can use, evaluate and co-develop AI-based assistive technology responsibly, and **ICT curricula** must produce graduates who understand the clinical, ethical and human context in which such technology operates (Zahlan et al., 2023; van Haeften et al., 2024; Sriharan et al., 2024). Sections 2 to 5 measure how far current provision is from that statement.*

1.4 Methodology

D4.2 follows the two-step methodology committed in the WP4 proposal, applied on top of the D4.1 evidence base and closed by a synthesis layer.

- **Evidence base (from T4.1).** A structured survey of 28 questions answered by 34 educators and programme coordinators of consortium institutions, covering programmes from EQF level 4 to EQF level 7 in healthcare and ICT, plus the qualitative material from its open-ended questions. Section 2 recapitulates the findings; Annex A summarises the instrument and sample.
- **Step A, industry validation (WP2 T2.2).** The consolidated T4.1 findings are checked against the working-life perspective of the innovation ecosystem actors convened by the WP2 camps. The first camp took place online on 2 June 2026 with fifteen ecosystem actors and the project group, focused on end-user needs around MCI and early-stage dementia. Step A was closed on that camp material, on the partner review of September 2026, which includes the written reflections of the consortium's working-life partners, and on the plenary discussion at the Annual Partner Meeting in Breda (22–23 September 2026); the written form is carried over to the validation of the T4.3 curricula drafts. Section 4.5 and Annex C hold the record.
- **Step B, European benchmarking (UPV-led).** Desk research comparing the competence requirements of partner-country programmes with a curated set of European educational offerings at EQF 5 to 7, using the EQF descriptors (knowledge, skills, responsibility and autonomy) and the EQAVET quality reference framework as comparison axes, complemented by the European competence frameworks DigComp 2.2 (digital competence for citizens), DigCompEdu (digital

competence for educators), EntreComp (entrepreneurship) and GreenComp (sustainability); all four are defined in Annex F and cited in the References. Section 5 presents the results; Annex B lists the reference programmes.

- **Synthesis.** The gaps from D4.1, the corrections and priorities from Step A, and the European reference picture from Step B are cross-tabulated into the European gaps matrix of Section 5.4, which classifies each gap by thematic area, EQF level, affected track, severity, validation status and DETECT 2.0 response.

Throughout the document, **competences are expressed in the knowledge / skills / attitudes** triad used by the **European competence frameworks**, and referenced to EQF levels. Where a competence belongs specifically to the vocational track it is tagged VET, where it belongs to higher education it is tagged HEI, and where it applies to both it is tagged accordingly.

1.5 Status of this version and validation record

This document is the final version (v1.0) of D4.2, prepared by the WP4 lead team at UPV and closed on 30 September 2026 after the partner review round and the Annual Partner Meeting in Breda, in accordance with the Outline and Section Ownership working document agreed after the Project Management Committee of 18 June 2026. The country gap analyses for Finland, the Netherlands and Portugal were drafted from the D4.1 dataset and from public documentation, following the working arrangement communicated to the partners before the summer, by which the WP4 lead carries the drafting and partners review, refine and add. The Spanish section serves as the structural model for the other three.

Partner validation was conducted through the margin comments of the review draft (v0.9, August 2026) and by email, by the designated country owners and validation tracks recorded in Annex E. The reviews received are integrated in this version: LAB's checked copy of 14 September (Sections 2 and 4.1, Table 9), Vision Factory's comments of 16 and 23 September (terminology; Step A route), Curio's confirmation of 21 September (Section 4.3 and Table 11, VET reading), and the written reflections of 't Heem (21 September) and Macomi (25 September) on Sections 5 and 6. Tredu, Avans and IPN raised no corrections to their sections within the review window; those sections stand as drafted and remain open to refinement in T4.3. The pre-final version (v0.99) was discussed at the Annual Partner Meeting in Breda (22–23 September), and v1.0 is submitted to EACEA through the Funding & Tenders Portal on 30 September 2026.

1.6 Limitations

Stating limitations openly is part of the method. Five apply to this deliverable, and each has a handling route.

- **Sample size and composition.** The D4.1 survey collected 34 valid responses from four institutions (no responses were received from Avans within the survey window,

see Section 2.1): solid for a consortium gap analysis, not a representative sample of European education. The European benchmark of Section 5 compensates from the provision side.

- **Country attribution of one institution.** The D4.1 sample table listed Curio under Finland; Curio is a Dutch VET provider (Breda and Roosendaal), and its ten responses are treated as Dutch evidence throughout this document. No consortium-level figure changes. LAB confirmed the correction in the September 2026 review and Curio confirmed the Dutch VET reading on 21 September 2026.
- **Self-reported data.** Survey answers are self-assessments by educators and coordinators, with the usual biases in both directions.
- **Step A closed on a narrower base than planned.** The structured outputs of the 2 June 2026 needs camp were not available in consolidated form at the freeze and the written form of Annex C was not circulated; Step A therefore rests on the camp's documented material, the partner review (including the written reflections of the working-life partners) and the Breda plenary, and the written form is carried over to the T4.3 validation at the next ecosystem camp (Section 4.5, Annex C).
- **Benchmark coverage.** The European benchmark is a curated comparison, not a census; the three entries marked * in Table 15 were rated from published descriptions alone, and the list remains open to extension in T4.3 (Annex B).

2. Recap of D4.1 findings (Task 4.1)

This section condenses Deliverable D4.1 (Curricula Analysis, April 2026) to the level of detail needed to follow the rest of this document. Readers who need the full analysis should consult D4.1 itself and its peer-reviewed synthesis in the LAB RDI Journal (Komssi, Pöntiö & Ferri-Mollá, 2026).

2.1 Survey design and sample

Task 4.1 administered a structured questionnaire of 28 questions to educators and programme coordinators of the consortium's educational institutions, collecting 34 valid responses. The instrument covered respondent and programme profile, coverage of AI-based assistive technology in healthcare and in dementia care, innovation competences and project work, entrepreneurship, sustainability, foundational digital skills and graduates' AI readiness, and open questions on gaps, barriers and future needs (see Annex A for the full structure). Programmes ranged from EQF level 4 (upper secondary VET) to EQF level 7 (Master's level), in both healthcare and ICT fields.

Institution	Country	Sector	Responses	Share
Tredu (Tampere Vocational College)	Finland	VET	13	38.2%
Curio	Netherlands	VET	10	29.4%
LAB University of Applied Sciences	Finland	HEI	7	20.6%
Universitat Politècnica de València (UPV)	Spain	HEI (ICT)	4	11.8%

Table 1. D4.1 survey sample by institution.

By programme type, as declared by the respondents, 24 responses (70.6%) came from VET programmes and 10 (29.4%) from HEI programmes; one UPV respondent teaching a Master's-level ICT programme classified it as VET, which is why the institutional count of Table 1 (23 VET, 11 HEI) differs by one. This document keeps the respondent classification used in D4.1 and in the peer-reviewed analysis, so that all cross-tabulations remain comparable. By field, 22 responses (64.7%) came from healthcare programmes and 12 (35.3%) from ICT programmes. The largest single segment, VET healthcare, is also the principal training pathway for the professionals who deliver most day-to-day dementia care. **The four institutions in Table 1 are the consortium members from which responses were received**: no responses arrived from Avans University of Applied Sciences within the February–March 2026 survey window, so its HBO programmes enter this deliverable through the desk research and the partner review of Section 4.3 rather than through the D4.1 sample.

2.2 Headline quantitative findings

Indicator	Result
Programmes with no coverage of AI-based assistive technology in healthcare, or superficial coverage only	82.4% (35.3% none, 47.1% superficial)
Programmes with moderate AI coverage	17.6%
Programmes with in-depth AI coverage	0.0%
Programmes with no dementia-specific content	70.6%
Programmes with a dedicated dementia module or topic	5.9% (minor case studies: 23.5%)
Educators not, or only slightly, confident that graduates can use AI-driven tools effectively and responsibly	64.7% (79.2% in VET, 30.0% in HEI)
Programmes with no novel development projects for students	82.4%
Programmes with no health-tech entrepreneurship content	73.5% (no entrepreneurship topic covered: 79.4%)
Programmes formally teaching none of the foundational digital skills listed	20.6%
Programmes with moderate or strong emphasis on interdisciplinary healthcare–ICT collaboration	14.7% (no emphasis: 50.0%)
Mean sustainability integration score	2.2 / 5
Programmes explicitly teaching ethical considerations of AI	29.4% (green or sustainable AI addressed: 11.8%)

Table 2. Headline results of the D4.1 survey (n = 34). Source: D4.1 dataset (Microsoft Forms export, recomputed for this deliverable) and Komssi, Pöntiö & Ferri-Mollá (2026); question numbers in Annex A.

Behind the aggregate AI figures, what programmes actually teach is narrow and concentrated on the care side. Asked which AI-based assistive technologies or applications are explicitly taught (multiple answers allowed), respondents most often named AI-powered patient monitoring systems such as fall detection and vital-sign tracking (32.4% of programmes), support for activities of daily living and independent living (29.4%), ethical considerations of AI such as privacy, autonomy and data security (29.4%), AI-powered virtual assistants (26.5%), cognitive training applications (26.5%) and generative AI or large language models for documentation or patient interaction (26.5%); AI-enabled communication tools for patients and carers follow at 23.5%, and AI-based clinical decision support closes the list at 5.9%. **More than a third of programmes (35.3%) teach none of these technologies, and the answers cluster in healthcare programmes: ICT programmes name almost exclusively generative AI and ethics**. On the regulatory and ethical side, data privacy and security principles (for example GDPR in healthcare) are the most widespread of the foundational digital skills formally taught and assessed (64.7%), but as generic data handling rather than AI-specific practice; the development of green or sustainable AI solutions is addressed in 11.8% of programmes and partially in a further 35.3%.

Digital readiness is uneven in the same way. Asked which foundational digital skills are formally taught and assessed, respondents named understanding data privacy and security principles (64.7%), navigating and using AI-driven software interfaces (38.2%), identifying bias in data or AI recommendations (35.3%) and data identification and interpretation in a clinical context (20.6%); **one programme in five (20.6%) formally teaches none of them**. The skills most needed to work safely with AI in care, interpreting clinical data and recognising bias, are the least taught on the care side (27.3% and 13.6% of healthcare programmes), while ICT programmes teach bias identification (75.0%) and interface use (66.7%) but rarely clinical data interpretation (8.3%).

The survey did not ask which competence frameworks programmes use as a reference, and none of the partner-country programmes examined in Section 4 is built on an AI-specific competence framework for healthcare education. European reference points are only now emerging: the joint European Commission–OECD AILit Framework (2026) organises AI literacy into the same knowledge, skills and attitudes structure used in Section 3, but targets primary and secondary education; UNESCO's AI competency frameworks for students and teachers (2024) provide a global baseline that remains generic rather than healthcare-specific; and the first WHO/Europe review of AI readiness across the 27 EU Member States (2026) urges governments to strengthen health-workforce readiness through training in AI fundamentals, ethics and data governance. None of these instruments yet defines AI competences for healthcare education at EQF levels 5–7, which matters because Article 4 of the AI Act now presupposes exactly such structured AI literacy in deploying organisations. Figure 4 visualises both coverage distributions.

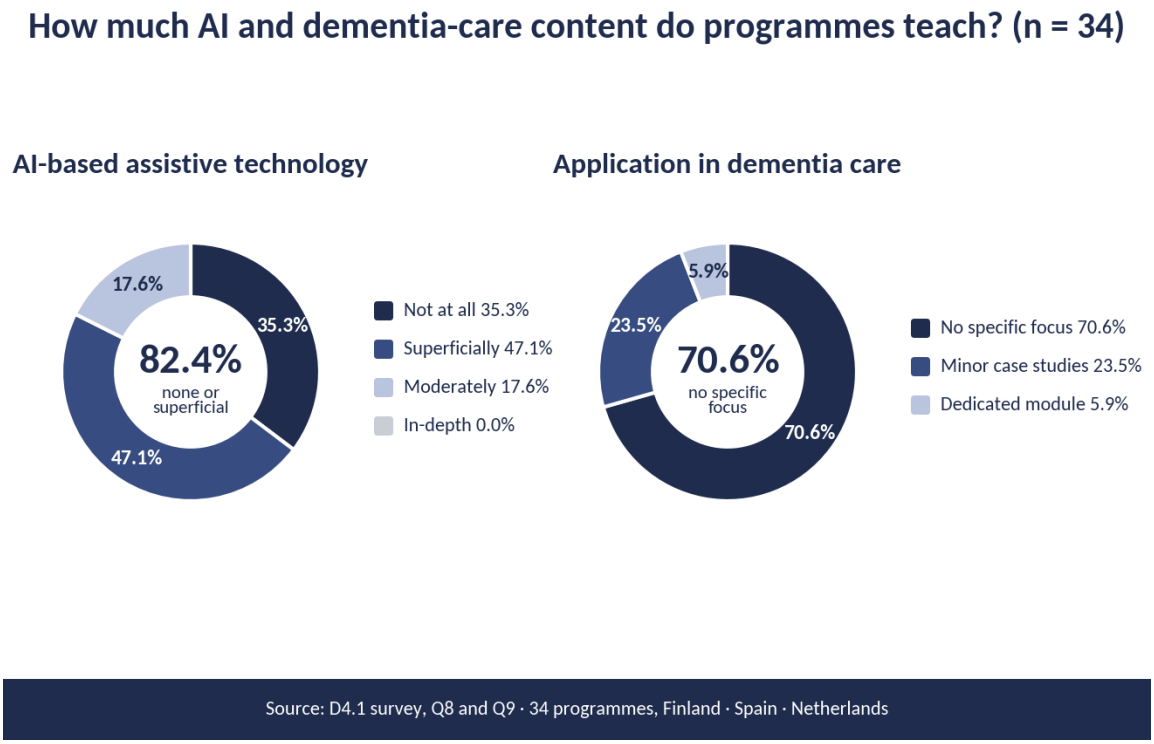


Figure 4. Distribution of AI-based assistive technology content and dementia-care application across the 34 surveyed programmes. Source: D4.1 dataset (Q8, Q9).

2.3 Cross-segment analysis

The contrasts between segments carry most of the analytical weight, and they do not form a simple HEI-over-VET or ICT-over-healthcare gradient. Care programmes, VET care programmes in particular, are the ones that most often expose students to AI-based assistive technology and to dementia, but superficially; ICT programmes hold the technical competence and the most confident educators, and almost no healthcare or dementia context. **The segments that healthcare AI most depends on are each missing half of what is needed**.

Segment	n	No AI coverage	No dementia focus	Not or only slightly confident in graduates' AI readiness	Novel-solution projects
VET – Healthcare	19	15.8%	52.6%	78.9%	21.1%
VET – ICT	5	80.0%	100%	80.0%	0.0%
HEI – Healthcare	3	0.0%	66.7%	100%	33.3%
HEI – ICT	7	71.4%	100%	0.0%	14.3%

Table 3. Four-way segmentation of the D4.1 sample (respondent-declared institution type). Source: D4.1 dataset; segmentation as in Komssi, Pöntiö & Ferri-Mollá (2026).

Two readings follow. VET healthcare, the largest segment (55.9% of the sample), is where AI-based assistive technology is most often present but almost always superficial (63.2% superficial, 21.1% moderate), where educators are least confident in their graduates' AI readiness (78.9% not or only slightly confident) and where sustainability integration is strongest (2.6 of 5); it is the primary target for the educational response of Section 6. The two ICT segments show the opposite profile: the highest shares of programmes with no coverage at all of AI-based assistive technology in healthcare settings, which is what the survey asked (80.0% in VET ICT, 71.4% in HEI ICT), no dementia focus in any programme, and sustainability scores of 1.0 and 1.3; HEI ICT educators are, at the same time, the only group confident in their graduates' AI readiness. The deficit therefore runs in both directions: **care education is missing technical content, and technical education is missing care context**. The two deficits are mirror images, and the response framework treats them as one interdisciplinary problem. Figure 5 visualises the four segments.

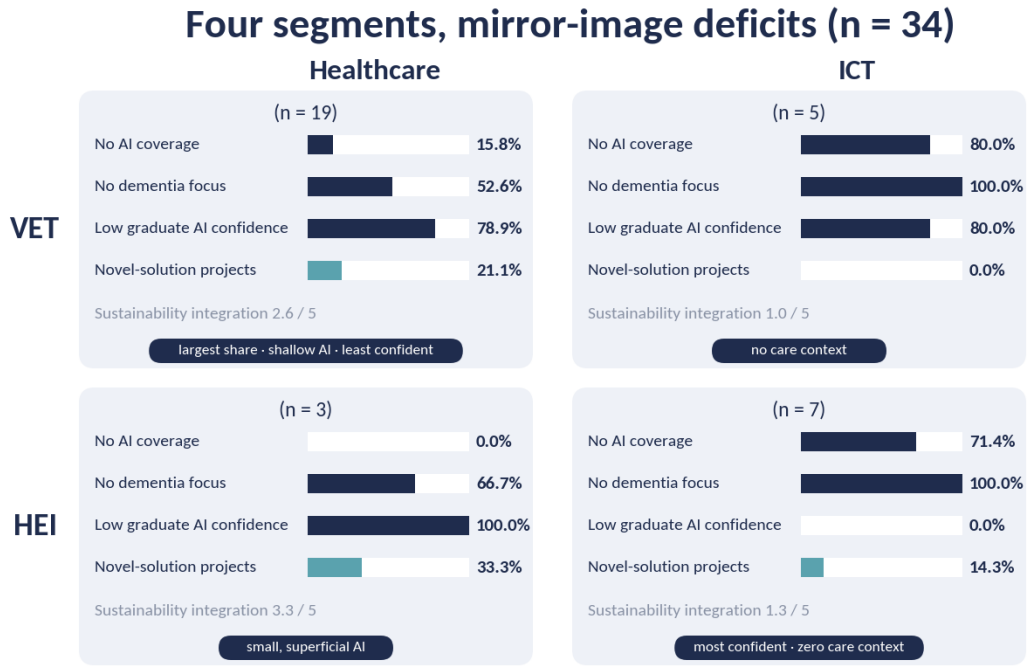


Figure 5. Four-way segmentation of the D4.1 sample: mirror-image deficits between care and technical education. Source: D4.1 dataset; segmentation as in Komssi, Pöntiö & Ferri-Mollá (2026).

2.4 Qualitative findings

The open-ended responses locate the causes. Twenty-two educators described the barriers their institution faces; coded thematically, the most cited is lack of teacher expertise and training (14 of 22, 63.6%), followed by insufficient funding and resources (7, 31.8%), lack of time and the pace of technological change (6, 27.3%), curriculum structures that leave no room for new content (5, 22.7%), lack of teaching materials and equipment (4, 18.2%) and negative attitudes towards adopting new skills (2, 9.1%). The verbatim answers are blunt: “staff competence; continuing education is needed”; “teacher expertise: how to stay up to date?”; “strict clinical competence requirements leave no room to add hours for other topics”; “AI has risen so quickly that addressing its impacts in slow curriculum processes is difficult”.

When asked what they want added (eighteen answers), educators requested AI in care and AI literacy, including AI applications during internships; digital and wellbeing-technology skills as part of nursing work; collaboration between healthcare and ICT students, work-life collaboration and real client guidance as part of teaching; the fundamentals of responsible AI and data use, privacy, legislation and ethics; cybersecurity; sustainability and green AI; patient-centred technology, usability and accessibility; VR and immersive environments; robotics adoption; and development and innovation

competence. This request list reads as a first draft of the competence map, and Section 3 formalises it.

2.5 Peer-reviewed synthesis and what D4.2 adds

The T4.1 analysis was condensed into a peer-reviewed article, "Bridging the AI Skills Gap in Healthcare and ICT Education: A Curricular Gap Analysis Across European VET and HEI Institutions", published in the LAB RDI Journal on 12 August 2026 (Komssi, Pöntiö & Ferri-Mollá, 2026). Publication in an open RDI journal gives the WP4 evidence base an externally reviewed, citable anchor within Month 10 of the project.

D4.2 adds four things to that baseline: the industry validation of Step A, the European benchmark of Step B, the competence map that converts survey findings into teachable units referenced to EQF levels, and the gaps matrix that assigns each gap a response inside the project. **D4.1 measured the distance; D4.2 organises the crossing**.

3. Competence map: knowledge, skills and attitudes

This section is the **analytical heart of the deliverable 4.2**. It converts the deficits measured in D4.1, the requests voiced by educators, and the requirements arriving from European frameworks and legislation into a structured competence map: **what graduates of healthcare and ICT programmes need to know (knowledge), be able to do (skills) and be disposed to do (attitudes) in order to develop, deploy and use AI-based assistive technology for people with MCI or early-stage dementia**.

3.1 How the map was built and how to read it

Four sources feed the map. **First**, the D4.1 evidence: every gap measured in the survey implies a competence that current programmes fail to deliver, and the topics educators explicitly requested (Section 2.4) are treated as demand signals. **Second**, the European competence frameworks: DigComp 2.2 for digital competence, including its 2022 examples on interacting with AI systems (Vuorikari et al., 2022); DigCompEdu for educator competence; EntreComp for entrepreneurship; and GreenComp for sustainability. **Third**, the EQF level descriptors, which express learning outcomes in terms of knowledge, skills, responsibility and autonomy, and which allow each entry to be pitched at EQF 5, 6 or 7, with EQF 4 noted where the VET entry level requires it. **Fourth**, the legal baseline: Article 4 of the AI Act makes AI literacy a duty for organisations that deploy AI systems, the GDPR and the European Health Data Space Regulation condition all health data practice, and Directives 2005/36/EC and 2013/55/EU frame the regulated health professions.

These four sources are also the selection rule: an entry appears in the map only when the D4.1 evidence shows that current programmes do not deliver it, a deficit measured in the survey (Section 2.2) or an explicit educator request (Section 2.4), and at least one European reference (a framework, an EQF descriptor or a legal duty) confirms that graduates are expected to have it. **Every entry is therefore doubly grounded: in evidence of absence and in evidence of expectation**.

How to audit each entry. The Derived from column of Tables 4 to 8 records this double grounding entry by entry, so that every row can be traced back to its evidence; the legend below decodes the source tags. Entries tagged NC reflect the end-user needs focus documented for the needs camp of 2 June 2026 (Annex C) and are re-verified against the ecosystem actors' answers to the Annex C form during the T4.3 validation.

Reading the Derived from column. S§n = gap measured in the D4.1 survey (Section n of D4.1) · REQ = topic explicitly requested by educators (D4.1, Section 5.6) · BAR = response to a barrier identified by educators (D4.1, Section 5.5) · QUAL = qualitative theme of D4.1 (Section 5) · NC = end-user needs focus documented for the needs camp of 2 June 2026 (Annex C) · GA = scope committed in the Grant Agreement · WP2 / WP3 = derived from the ecosystem and hackathon designs · DC = DigComp 2.2 · DCE = DigCompEdu · EC = EntreComp · GC = GreenComp · EQF = EQF level descriptors · LEX = legal baseline (AI Act

Article 4, GDPR and EHDS, Directives 2005/36/EC and 2013/55/EU) · WHO = WHO guidance on the ethics of AI for health · BMK = corroborated by the European benchmark of Section 5, where the competence is absent from current offerings.

Each of the five subsections below covers one thematic area inherited from Task 4.1. Entries are tagged with the EQF level or range at which the competence should be acquired and with the track (VET, HEI or Both). The tags encode a progression that runs through the whole map: at EQF 4 and 5, operational competence (use AI-enabled tools safely, recognise their limits, support clients in using them); at EQF 6, evaluative competence (select, integrate and lead the adoption of tools in a care organisation, or build applications under guidance); at EQF 7, design competence (create, validate and govern AI solutions for care contexts).

The map is deliberately **reusable**: **T4.3 will turn it into curricula drafts**, **T4.4 into digital educational materials**, and WP3 uses it to align hackathon evaluation criteria and the pre- and post-surveys. Figure 6 shows the map at a glance. The 61 entries are formulated specifically for this deliverable; they do not reproduce the frameworks' own competence lists (DigComp 2.2 defines 21 competences, DigCompEdu 22, EntreComp 15, GreenComp 12), which inform the entries rather than supply them.

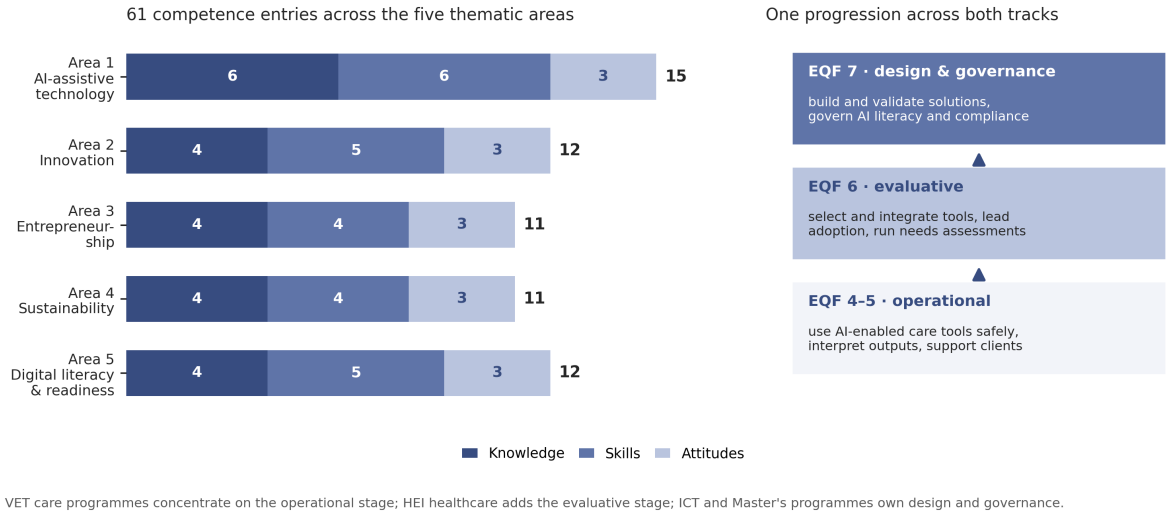


Figure 6. The competence map at a glance: 61 entries across the five thematic areas, and one progression from operational to design competence shared by both tracks. Source: Tables 4 to 8.

3.2 Area 1 — Utilisation of AI-based assistive technology

The D4.1 evidence for this area is the bleakest: **82.4% of programmes teach no or only superficial content on AI-based assistive technology, 70.6% contain no dementia-specific content, and no programme teaches AI in depth**. The competences below close that distance.

#	Competence	Type	EQF	Track	Derived from
1.1	Core AI concepts and terminology (machine learning, natural language processing, computer vision, generative AI), explained without advanced mathematics	K	4–5	Both	S§3.1 · REQ · DC

#	Competence	Type	EQF	Track	Derived from
1.2	Main families of AI-based assistive technology for MCI and early-stage dementia: cognitive screening support, speech and language analysis, sensor-based monitoring, reminder and orientation aids, conversational agents and social robots	K	5–6	Both	S§3.2–3.3 · REQ · NC
1.3	What AI systems can and cannot do: probabilistic outputs, typical error modes, sources of bias, dependence on data quality	K	5–6	Both	REQ · DC · LEX
1.4	The clinical pathway of MCI and early-stage dementia, and the points where AI-supported detection, monitoring and support can intervene	K	5–6	Both	NC · GA · REQ
1.5	Technical foundations of machine learning pipelines for health-related signals: data acquisition, representation, training, validation, clinically meaningful metrics	K	6–7	HEI (ICT)	S§4.2 · GA
1.6	Regulatory position of AI in care: AI Act risk categories and the Article 4 AI literacy duty, medical device boundaries, GDPR and EHDS essentials	K	6–7	Both	LEX · BAR
1.7	Operate and configure common AI-enabled care tools (reminders, monitoring dashboards, speech interfaces) safely in daily practice	S	4–5	VET	S§4.3 · REQ · NC
1.8	Interpret AI outputs (alerts, risk indicators, transcriptions) with calibrated trust, and recognise when to escalate to human judgement	S	5–6	Both	REQ · LEX · WHO
1.9	Support a person with MCI, and their family, in adopting an assistive AI tool, adapting to cognitive ability, preferences and consent	S	4–6	VET / Healthcare	NC · GA
1.10	Evaluate an AI tool for a specific care setting: evidence base, usability, data protection, integration and maintenance burden	S	6–7	Both	BAR · EQF · LEX
1.11	Design, train and validate machine learning models on health-related data, and document their limits honestly	S	7	HEI (ICT)	GA · S§4.2
1.12	Translate clinical and caregiver requirements into technical specifications, and technical constraints back into care language	S	6–7	Both	S§4.2 · S§3.5
1.13	Person-centred stance: the technology serves the dignity, autonomy and safety of the person with dementia	A	all	Both	NC · WHO
1.14	Calibrated critical trust in AI: neither reflexive rejection nor automation complacency	A	all	Both	QUAL · WHO
1.15	Professional ownership of outcomes in AI-supported decisions	A	5–7	Both	WHO · LEX

Table 4. Competence map, Area 1: utilisation of AI-based assistive technology. K = knowledge, S = skill, A = attitude.

3.3 Area 2 — Development of innovations

82.4% of the surveyed programmes include no novel development projects, only 14.7% place moderate or strong emphasis on interdisciplinary healthcare–ICT collaboration, and prototyping receives no emphasis in 44.1%. Innovation competence is precisely what the WP3 hackathons exercise, so this part of the map doubles as their learning outcome frame.

#	Competence	Type	EQF	Track	Derived from
2.1	Innovation processes for care contexts: design thinking, service design, co-creation with end users and ecosystems	K	5–6	Both	NC · EC · QUAL
2.2	Prototyping concepts: from idea canvas and low-fidelity mock-ups to functional high-fidelity prototypes	K	5–6	Both	WP3 · S§3.5
2.3	Needs assessment methods for users with cognitive impairment: observation, proxy interviews, ethical co-design	K	6–7	Both	NC · WHO
2.4	Pilots and living labs in real care settings: purpose, design, evaluation	K	6–7	HEI	GA · WP2
2.5	Conduct a structured needs assessment with end users, families and professionals in MCI and dementia care	S	5–7	Both	NC · EC
2.6	Work productively in an interdisciplinary innovation team (hackathon-style) mixing healthcare and ICT profiles	S	4–7	Both	S§3.5 · WP3
2.7	Build and test a low-fidelity prototype of an assistive solution and iterate from user feedback	S	5–6	Both	WP3 · EC
2.8	Document and present a solution idea convincingly to a mixed jury (canvas, poster, pitch)	S	4–6	Both	WP3
2.9	Plan the evaluation of an innovation in practice, including measures of care benefit	S	6–7	HEI	GA · EQF
2.10	Experimental mindset: treat iteration and failed prototypes as method, not defeat	A	all	Both	EC · QUAL
2.11	User-first curiosity: needs before technology	A	all	Both	NC · EC
2.12	Openness to cross-disciplinary collaboration and vocabulary	A	all	Both	S§3.5 · EC

Table 5. Competence map, Area 2: development of innovations.

3.4 Area 3 — Entrepreneurship

73.5% of programmes provide no exposure to entrepreneurial thinking, and the qualitative material shows the deficit is sharpest in healthcare education, where clinical curricula leave no room for it. The entries below are anchored in EntreComp, the EU reference framework, and pitched so that entrepreneurship serves care improvement, whether or not a venture is created.

#	Competence	Type	EQF	Track	Derived from
3.1	The EntreComp model: spotting opportunities, mobilising resources, moving into action	K	4–6	Both	EC
3.2	Business and service models in health and welfare technology, including public procurement and reimbursement logic	K	6–7	Both	EC · BMK
3.3	Intellectual property, certification and regulatory basics for health technology ventures	K	6–7	HEI	GA · LEX
3.4	Innovation ecosystem actors and intermediaries: incubators, technology transfer offices, clusters, funding instruments	K	5–7	Both	WP2 · NC
3.5	Identify improvement opportunities from daily care practice and articulate them as problems worth solving	S	4–6	Both	EC · QUAL

#	Competence	Type	EQF	Track	Derived from
3.6	Draft a simple value proposition and stakeholder map for an assistive solution	S	5–6	Both	EC · WP3
3.7	Pitch a solution idea to decision-makers and investors in accessible language	S	5–7	Both	WP3 · EC
3.8	Assess feasibility and viability of a solution in a public care system context	S	6–7	HEI	GA · EC
3.9	Initiative and perseverance: acting on an identified opportunity	A	all	Both	EC · GA
3.10	Resilience and adaptability in the face of uncertainty and setbacks	A	all	Both	EC · GA
3.11	Ethical enterprise: value for people in care as the primary return	A	all	Both	EC · WHO

Table 6. Competence map, Area 3: entrepreneurship.

3.5 Area 4 — Sustainability related to healthcare and technology

With a mean **sustainability integration score of 2.2 out of 5, and green or sustainable AI addressed in 11.8% of curricula**, sustainability is **the least developed of the five areas**. The entries draw on GreenComp and extend it to the specific footprint and equity questions that AI in care raises.

#	Competence	Type	EQF	Track	Derived from
4.1	Environmental footprint of digital and AI systems: energy use, hardware lifecycle, data storage	K	4–6	Both	GC · S§3.6
4.2	Green computing options: efficient models, on-device inference, reuse before rebuild	K	6–7	HEI (ICT)	GC · BMK
4.3	Social sustainability of care technology: equity of access, digital exclusion of older adults, workforce impact	K	5–6	Both	GC · WHO · NC
4.4	Systems view of sustainable care: prevention, early intervention and technology as parts of one system	K	6–7	Both	GC · GA
4.5	Apply energy and footprint criteria when selecting or recommending digital tools for a care organisation	S	5–7	Both	GC · BAR
4.6	Make frugal-AI design choices where they meet the clinical need	S	7	HEI (ICT)	GC
4.7	Assess the inclusion effects of an assistive deployment: who is left out, and what compensates for it	S	5–7	Both	WHO · NC
4.8	Embed sustainability criteria in innovation and procurement exercises from the start	S	6–7	Both	GC · EC
4.9	Stewardship: long-term responsibility over short-term convenience	A	all	Both	GC
4.10	Equity orientation: benefits of care technology reach those with least digital capital	A	all	Both	GC · WHO
4.11	Proportionality: match the technology to the need, not the fashion	A	all	Both	GC · WHO

Table 7. Competence map, Area 4: sustainability related to healthcare and technology.

3.6 Area 5 — Digital literacy and readiness

This area underpins the other four. The D4.1 data show **64.7% of educators not, or only slightly, confident in their graduates' AI readiness**, one programme in five teaching none of the foundational digital skills listed (20.6%) and, in the qualitative material, students entering healthcare programmes with limited digital literacy. The entries follow DigComp 2.2, whose 2022 revision added explicit examples for interacting with AI systems, and DigCompEdu for the educator side; they also operationalise the AI literacy that Article 4 of the AI Act expects of deploying organisations.

#	Competence	Type	EQF	Track	Derived from
5.1	The DigComp competence areas applied to care work: information literacy, communication, content creation, safety, problem solving	K	4–5	Both	DC · S§3.7
5.2	Data literacy for health contexts: data types, quality, provenance, privacy, secondary use under GDPR and EHDS	K	5–7	Both	DC · LEX · S§3.6
5.3	Cybersecurity essentials in care settings: phishing, credentials, device hygiene, incident reporting	K	4–5	Both	DC · QUAL
5.4	What 'sufficient AI literacy' means under Article 4 of the AI Act, and who is responsible for it in a care organisation	K	5–7	Both	LEX · BMK
5.5	Confident daily digital practice: records, professional communication, telecare platforms	S	4–5	VET	DC · QUAL
5.6	Critically evaluate digital information, including AI-generated content, before acting on it	S	4–7	Both	DC · LEX
5.7	Use generative AI assistants appropriately in professional tasks, with verification and disclosure habits	S	5–7	Both	DC · REQ
5.8	Protect personal and patient data across devices and services	S	4–7	Both	DC · LEX
5.9	Coach colleagues, students or clients in building digital skills (DigCompEdu for the educator role)	S	6–7	Both	DCE · S§3.4
5.10	Disposition to lifelong digital learning as tools change	A	all	Both	DC · BAR
5.11	Calm adaptability towards new systems, without dependence on any single tool	A	all	Both	DC · BAR
5.12	Inclusion-mindedness towards users with low digital skills, starting with older adults	A	all	Both	DC · NC

Table 8. Competence map, Area 5: digital literacy and readiness.

3.7 Reading the map across levels and tracks

Read vertically, the map gives each programme type a distinct assignment.

VET care programmes (EQF 4 and 5) concentrate on **operational competences**: safe daily use of AI-enabled tools, calibrated interpretation of their outputs, client support, digital self-defence, plus participation-level innovation experiences.

HEI healthcare programmes (EQF 6) add evaluative competences: selecting tools for a setting, leading adoption, running needs assessments and pilots.

ICT programmes at EQF 6 and 7 own the design competences, and inherit the care context, ethics and sustainability entries that D4.1 shows they currently lack.

Master's level programmes (EQF 7) add governance: validating models, managing regulatory duties and steering organisational AI literacy.

Read horizontally, the attitudes rows are deliberately shared across all levels and both tracks.

The working-life check of Step A (Section 4.5) singled out precisely this shared core. The consortium's long-term care provider, 't Heem, named the ability to critically assess AI-supported insights (entries 1.8 and 1.14), to address ethical considerations (1.6, 2.3, 5.4) and to keep the needs and preferences of people living with dementia and their families central (1.9, 1.13) as what future professionals will need next to the technical and digital competences themselves.

The consortium's working hypothesis, to be tested in the WP3 hackathons, is that attitudes move fastest when healthcare and ICT students work on one shared problem, which is why interdisciplinary experience appears in every area of the map.

---

4. Country gap analysis: Finland, Spain, the Netherlands, Portugal

This section reads the consortium's four countries against the competence map. Each country subsection follows the same structure: the education system in brief, the DETECT 2.0 survey evidence for that country, a starter list of reference programmes examined, the gaps read against the competence map, and the national context factors that shape them. The section closes with the industry validation record (Step A).

4.1 Finland

Education system. Finnish higher education is binary: research universities and universities of applied sciences (UAS), the latter awarding professionally oriented Bachelor's degrees at EQF 6 and Master's degrees at EQF 7. Vocational education and training is competence-based since the 2018 VET reform, with vocational upper secondary qualifications at EQF 4 and specialist vocational qualifications at EQF 5, delivered by providers such as Tredu, one of the country's largest. Finland was the first EU member state to publish a national AI strategy (2017), created the Elements of AI open course (University of Helsinki and MinnaLearn) that has introduced more than two million learners to AI basics, and operates nationwide digital health infrastructure through the Kanta services. The wellbeing services counties reform of 2023 reorganised the employers of most care professionals.

DETECT 2.0 evidence. Finland contributes the largest share of the D4.1 sample: 13 VET responses from Tredu (practical nurse, ICT technician, social and health care programmes) and 7 HEI responses from LAB (nursing, physiotherapy, information technology). The pattern is the consortium pattern in concentrated form. Dementia care content is comparatively present (the practical nurse qualification includes it as standard), yet AI content in care programmes is nearly absent, educators' confidence in their graduates' AI readiness is low, and the VET healthcare segment, largely Finnish, shows the shallowest AI presence of the whole dataset: present in most programmes, superficial in two out of three.

Programme (starter list)	Level	Track	Dementia/MCI content	AI/digital content
Vocational qualification in social and health care, lähihoitaja / practical nurse (e.g. Tredu)	EQF 4	VET	Yes, core	Minimal, generic ICT
Bachelor of Health Care, Nursing (e.g. LAB)	EQF 6	HEI	Partial	Digital health elements; AI marginal
Bachelor of Engineering, ICT (e.g. LAB)	EQF 6	HEI	None	AI modules present; no care context
Elements of AI (University of Helsinki / MinnaLearn), national open course	Open (non-EQF)	Open	None	AI literacy at population scale
Health and Human Services Informatics, Master's studies (University of Eastern Finland, Kuopio)	EQF 7	HEI	None	Health informatics; AI emerging
Master's Degree Programme in Health Technology (University of Turku), MSc (Tech), 120 ECTS	EQF 7	HEI	None	AI methods for health data, sensors, remote

Programme (starter list)	Level	Track	Dementia/MCI content	AI/digital content
				monitoring; no care context
Master's Programme in Health Technology Engineering (Aalto University), MSc (Tech), 120 ECTS; human-centred health informatics is an active research line at Aalto (HCHI group)	EQF 7	HEI	None	Health instrumentation, wearables, robotics and signal processing; AI marginal
Master's Programme in Development of Health Care Services (University of Helsinki, Faculty of Medicine), 120 ECTS, taught in Finnish	EQF 7	HEI	Not identified	Service development; AI not identified as a core topic in public curriculum information

Table 9. Finland, reference programmes examined (starter list; the three Master's programmes at the end were added on LAB's suggestion in the September 2026 review).

Gaps against the competence map. Area 1: operational AI competences (1.7 to 1.9) missing from lähihoitaja (practical nurse) and nursing curricula despite strong dementia care pedagogy; the national AI literacy asset (Elements of AI) is not care-contextualised and not systematically embedded in care qualifications. Area 2: innovation experiences exist in UAS pedagogy but rarely reach VET care students. Areas 3 and 4: entrepreneurship and sustainability entries appear in ICT and business programmes, marginally in care. Area 5: solid national digital infrastructure contrasts with low educator confidence in graduates' AI readiness, making the train-the-trainer response (Section 6) the highest-leverage intervention in Finland.

National context factors. A strong tradition of competence-based VET makes modular insertion straightforward once modules exist; national digital health data assets (Kanta) lower the barrier for realistic teaching cases; the 2023 public sector employer reorganisation means continuing education must reach the wellbeing services counties, not only schools.

4.2 Spain

Education system. Spanish universities award (*Grado)* degrees at EQF 6 and (*Máster)* degrees at EQF 7; nursing is a regulated university degree under Directive 2005/36/EC as amended by 2013/55/EU. Vocational education (*Formación Profesional*) awards Técnico qualifications at EQF 4 and Técnico Superior at EQF 5, and was reorganised by Organic Law 3/2022 into a single integrated system with explicit provision for micro-accreditations, a vehicle directly relevant to WP4's modular strategy.

Spain's national AI strategy (ENIA, 2020, refreshed as the Estrategia de Inteligencia Artificial 2024) funds AI capacity building, and UPV hosts one of the country's leading AI research institutes (VRAIN), together with the university's Master's degree in Artificial Intelligence, Pattern Recognition and Digital Imaging (MUIARFID, EQF 7).

DETECT 2.0 evidence. Spain is represented in the D4.1 sample by four UPV responses from the ICT side (computer engineering, data science, AI applications). They illustrate the mirror deficit identified in Section 2.3: **advanced AI teaching with essentially no**

dementia or care contextualisation; the HEI ICT segment's zero score on dementia focus is largely this evidence. The Spanish care-side reading below is desk-based and validated internally at UPV.

Programme (starter list)	Level	Track	Dementia/MCI content	AI/digital content
Grado en Enfermería (nursing degree, regulated)	EQF 6	HEI	Partial (geriatric care)	Minimal; AI absent
Técnico en Atención a Personas en Situación de Dependencia	EQF 4	VET	Yes, applied	Basic digital only
Técnico Superior familia Sanidad (e.g. higher VET, health family)	EQF 5	VET	Partial	Generic ICT; AI absent
MUIARFID, Master's in AI, Pattern Recognition and Digital Imaging (UPV)	EQF 7	HEI (ICT)	None	Advanced AI; no care specialisation
Grado en Ciencia de Datos / Ingeniería Informática (UPV)	EQF 6	HEI (ICT)	None	Strong AI/data; no health context
Máster universitario de Salud Digital / eHealth (UOC, online, 60 ECTS)	EQF 7	HEI	None	Digital health core; AI elective

Table 10. Spain, reference programmes examined.

Gaps against the competence map. Area 1: nursing and dependency care curricula lack the operational and evaluative AI competences (1.7 to 1.10); ICT curricula lack the care pathway knowledge (1.4) and translation skills (1.12). Area 2: innovation project work exists in ICT degrees and in university innovation ecosystems but rarely includes care students or care problems. Area 3: entrepreneurship content concentrated in technical and business schools. Area 4: sustainability of digital care essentially untaught. Area 5: the FP reform's micro-accreditation instrument is exactly the delivery vehicle the response framework needs, and it is not yet used for AI-in-care content.

National context factors. Regulated professions constrain fast curricular change at EQF 6 (any nursing update must respect the directive's minimum training requirements), which raises the relative value of micro-credentials and continuing education; national AI strategy funding and the size of the Spanish care sector create favourable conditions for pilots; UPV's dual position in AI research and this consortium makes Spain the natural site for the cross-domain integration labs proposed in Section 6.

4.3 The Netherlands

Education system. Dutch higher professional education (HBO) is delivered by universities of applied sciences such as Avans, awarding Associate degrees at EQF 5 and Bachelor's degrees at EQF 6; research universities add EQF 7 programmes. Secondary vocational education (MBO), delivered by providers such as Curio, runs up to MBO level 4 (EQF 4), including the standard care qualifications (verzorgende IG, mbo-verpleegkundige). The country published its Strategic Action Plan for AI in 2019 and coordinates public–private AI work through the Netherlands AI Coalition. Care workforce shortages are acute enough

that Dutch policy discourse speaks of a looming 'healthcare infarction', which makes labour-saving assistive technology a mainstream policy topic rather than a niche.

DETECT 2.0 evidence. The Netherlands contributes ten VET responses from Curio (practical nurse, data processing, social services programmes). They show the familiar pattern: care programmes with meaningful dementia exposure and negligible AI content, ICT programmes with the inverse. Avans did not contribute survey responses; its perspective enters through its WP3 leadership and through the partner review. At the top of the Dutch system, the University of Amsterdam's MSc Medical Informatics, with its explicit AI for Health track, demonstrates that the AI–care synthesis is achievable at EQF 7; the gap is diffusion downward, into HBO and above all into MBO care programmes.

Programme (starter list)	Level	Track	Dementia/MCI content	AI/digital content
Verzorgende IG / mbo-verpleegkundige (e.g. Curio)	EQF 3–4	VET	Yes, core	Minimal, generic digital
MBO ICT qualifications (e.g. Curio)	EQF 4	VET	None	Technical ICT; AI marginal
HBO Bachelor's, health and ICT programmes (e.g. Avans)	EQF 6	HEI	Partial	Digital health growing; AI uneven
MSc Medical Informatics, AI for Health track (University of Amsterdam / Amsterdam UMC)	EQF 7	HEI	Clinical context	Explicit AI-for-health synthesis
Clinical Technology BSc / Technical Medicine MSc (Leiden–Delft–Erasmus joint degree)	EQF 6–7	HEI	Clinical context	Medical technology; AI implicit

Table 11. Netherlands, reference programmes examined (starter list; the VET entries and the VET reading of this section were confirmed by Curio on 21 September 2026).

Gaps against the competence map. Area 1: MBO care qualifications lack the operational competences (1.7 to 1.9) although their graduates will operate daily alongside deployed care technology; HBO programmes cover digital health unevenly. Area 2: innovation pedagogy is comparatively strong in HBO (and in the national hackathon culture) but weakly connected to MBO care students. Area 3: entrepreneurship present in HBO business lines; not care-contextualised. Area 4: sustainability entries largely absent. Area 5: high national digital maturity contrasts with a care workforce whose AI literacy remains unaddressed at qualification level, exactly the population the AI Act's literacy duty will touch first as Dutch care providers deploy AI.

National context factors. Strong exemplars at EQF 7 and a policy environment actively seeking care workforce relief make the Netherlands the consortium's natural bridge between advanced practice and vocational diffusion; Avans's WP3 leadership positions the hackathons as the mechanism that brings MBO and HBO students into the same innovation space. From the care-provider side, 't Heem reports that digital technologies and AI-related applications are increasingly relevant in daily long-term care practice while many professionals are still developing the knowledge and skills to use them confidently and responsibly: the gap this section describes, seen from the workplace (partner review, 21 September 2026).

4.4 Portugal

Education system. Portuguese higher education comprises universities and polytechnics; polytechnics deliver short-cycle professional programmes (CTeSP) at EQF 5 alongside Licenciatura degrees at EQF 6 and Master's degrees at EQF 7; nursing is taught in dedicated schools (for example the nursing school of Coimbra) at EQF 6 under the same EU directives. Vocational routes at EQF 4 run through professional courses and the IEFP network. Nationally, the INCoDe.2030 programme drives digital competences across all levels, and the AI Portugal 2030 strategy frames AI capacity building. The consortium partner, Instituto Pedro Nunes (IPN), is a technology transfer and incubation institute linked to the University of Coimbra, and hosts the DETECT 2.0 project website.

DETECT 2.0 evidence. IPN is not an education provider. The desk reading is consistent with the consortium pattern: care education with no AI content, informatics education with no care context, and a national digital competences push (INCoDe.2030) that has not yet produced AI-in-care teaching at scale.

Programme (starter list)	Level	Track	Dementia/MCI content	AI/digital content
Licenciatura em Enfermagem (e.g. nursing school of Coimbra)	EQF 6	HEI	Partial (geriatrics)	Minimal; AI absent
CTeSP, health and social support areas (polytechnics)	EQF 5	VET/short-cycle	Partial	Basic digital only
Professional courses, health/social area (EQF 4 routes)	EQF 4	VET	Applied care	Minimal
MSc Informatics / AI programmes (e.g. University of Coimbra)	EQF 7	HEI (ICT)	None	Advanced AI; no care specialisation
Mestrado em Informática Médica / Health Informatics (University of Porto, FMUP; EFMI-accredited)	EQF 7	HEI	None	Medical informatics; decision support

Table 12. Portugal, reference programmes examined (starter list, desk-based).

Gaps against the competence map. The full map applies, with two Portuguese specifics. First, the CTeSP layer at EQF 5 is an underused insertion point: short-cycle, professionally oriented, polytechnic-delivered, it is structurally ideal for the modular AI-and-MCI units of Section 6. Second, IPN's incubation role connects Area 3 (entrepreneurship) to a live ecosystem, which the other countries mostly lack at partner level.

National context factors. INCoDe.2030 provides a national digital competence banner to attach project outputs to; demographic ageing in Portugal is among the most pronounced in the EU, sharpening demand; the absence of survey data makes Portuguese participation in the written validation track carried over to T4.3 (Annex C) doubly valuable.

4.5 Industry validation status (Step A)

Step A of the T4.2 methodology validates the identified gaps against working-life perspectives through the WP2 T2.2 innovation ecosystem camps. The first camp, “Collecting the Needs Camp”, was held online on 2 June 2026 with fifteen ecosystem

actors and the project group, organised by Vision Factory (Laura Väisänen, content design Krista Keränen), with UPV contributing the session “Unlocking the Power of AI in Development” (Isabel Ferri-Mollá). The camp was scoped to end-user needs around MCI and early-stage dementia; its consolidated outputs were not available to WP4 before the freeze of this deliverable, and its documented material is summarised in Annex C.

Step A was closed in three moves, recorded in Annex C. First, the camp’s documented material was read against the seven cross-cutting gaps of Section 5: it confirms the end-user orientation of the competence map and sits inside G2, G4 and G6, but it does not allow an item-by-item comparison of working-life gaps. Second, the partner review of September 2026 and the plenary discussion at the Annual Partner Meeting in Breda (22–23 September 2026), with the consortium’s working-life partners (Vision Factory, Macomi, ’t Heem) present, acted as the ecosystem check of the gaps and of the response framework: ’t Heem, as a long-term care provider, recognised the findings and the identified competence gaps from daily practice and stressed the ability to critically assess AI-supported insights, to address ethical considerations and to keep the needs and preferences of people with dementia and their families central (21 September); Macomi read the EQF 5–6 void of Section 5.2 as a structural gap between where VET stops (EQF 4) and where university provision starts (EQF 6–7), to be worked from both sides, and proposed that the prototypes carried to high fidelity in WP3 include work from both VET and HEI students (25 September; taken up in Section 7.1). Third, the six-question written form of Annex C, which was not circulated before the freeze, is carried over, with Vision Factory’s agreement of 23 September 2026, to the validation of the T4.3 curricula drafts with the ecosystem actors of all four countries at the next WP2 camp. The Evaluation Camp of 17 September 2026 was a hackathon jury session and was not used for gap validation.

5. Cross-cutting gaps and the European benchmark (EQF 5–7)

This section delivers Step B of the T4.2 methodology: the UPV-led **benchmarking of European educational offerings at EQF levels 5 to 7**, and the consolidation of everything measured so far into cross-cutting gaps and a single European gaps matrix.

5.1 Benchmarking approach

The benchmark compares the competence requirements of partner-country programmes (Section 4) against the European reference picture along two axes. The first axis is frameworks and obligations: what European instruments already define as expected competence (DigComp 2.2, DigCompEdu, EntreComp, GreenComp, the EQF descriptors, the EQAVET quality cycle) and what European law now requires (AI Act Article 4, GDPR, EHDS, the professional qualifications directives). The second axis is reference offerings: existing European programmes and courses at EQF 5 to 7 that occupy part of the target competence space, against which the partner countries' provision can be positioned. The internal quality target is at least twelve benchmarked reference programmes, at least three per partner country; the starter set is in the country tables of Section 4 and in Annex B.

Figure 7 summarises the route from the country readings to the matrix. The G codes it shows are the seven cross-cutting gaps defined in detail in Section 5.3 — in brief: AI fundamentals absent from care curricula (G1), no dementia-specific AI content (G2), educators short of AI expertise and doubtful of their graduates' AI readiness (G3), abstract teaching of ethics and sustainability (G4), innovation and entrepreneurship detached from care education (G5), healthcare–ICT silos (G6), and misalignment with European frameworks and the new AI Act duties (G7).

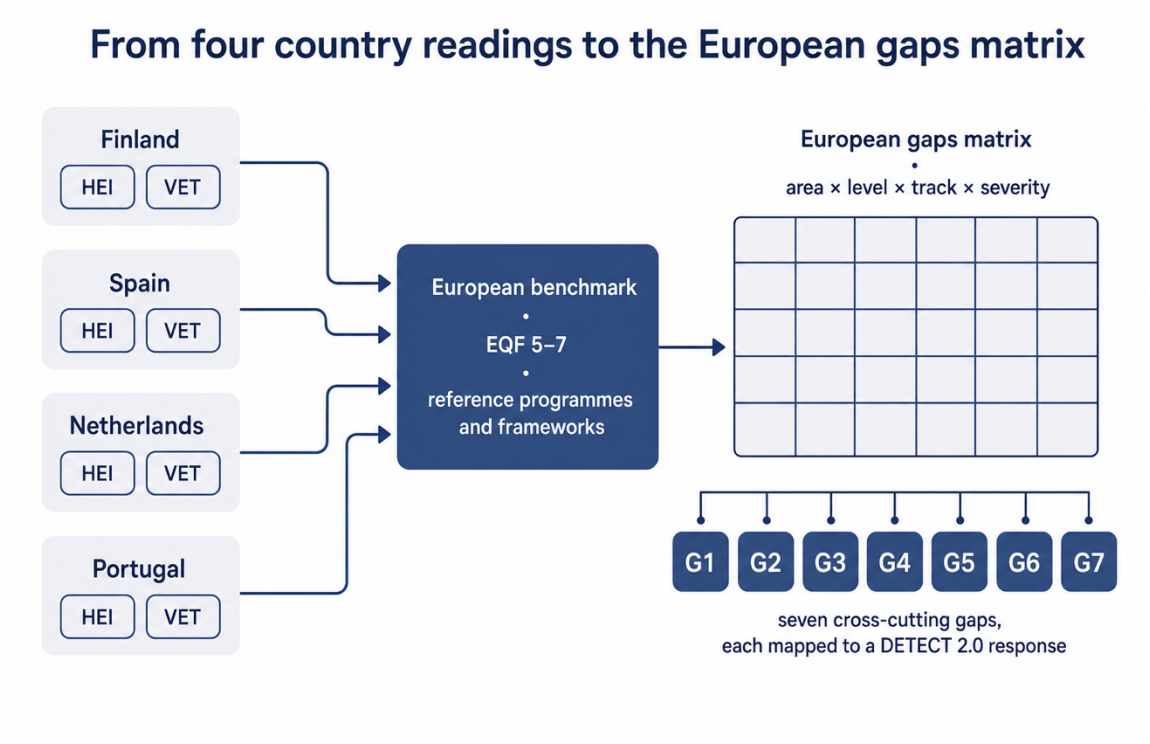


Figure 7. From the four country readings through the European benchmark (EQF 5–7) to the gaps matrix. The gap codes G1–G7 are explained in detail in Section 5.3.

5.2 The European reference picture

Read from the frameworks axis, the striking fact is how much of the required scaffolding already exists at European level. DigComp 2.2 describes citizen digital competence and, since its 2022 revision, includes worked examples of interacting with AI systems; DigCompEdu does the same for educators, which is the population D4.1 identifies as the first bottleneck. EntreComp and GreenComp define entrepreneurship and sustainability competence in the same knowledge, skills and attitudes grammar this deliverable uses. The EQF gives the level descriptors; EQAVET gives VET the quality assurance cycle. On the obligations side, Article 4 of the AI Act converts AI literacy from aspiration into duty for every organisation deploying AI systems, applicable since February 2025, and the EHDS Regulation (EU) 2025/327 institutionalises health data use that presupposes data-literate staff.

The Digital Decade programme quantifies the destination for 2030 (at least 80% of adults with basic digital skills, 20 million ICT specialists), the Council Recommendation on micro-credentials standardises the delivery format WP4 intends to use, and the EIT Deep Tech Talent Initiative demonstrates continental-scale appetite for deep tech upskilling, one million trained by mid-2025.

Read from the offerings axis, Europe shows excellence at the poles and a void between them. At the population pole, open AI literacy at national scale exists and works: Elements of AI, created in Finland, has introduced more than two million learners to AI basics across Europe. At the specialist pole, EQF 7 programmes such as KU Leuven's Master of Artificial

Intelligence, running for decades, produce advanced AI engineers, and a small number of integrative programmes, exemplified by the MSc Medical Informatics of the University of Amsterdam (UvA), with its AI for Health track, prove that the AI-and-care synthesis is teachable at Master's level. On the VET side, Cedefop's recent AI skills survey work confirms that AI is reshaping tasks across occupational profiles, including care, faster than VET curricula are adapting.

The void between the poles is precisely the DETECT 2.0 target zone. Between population-level AI awareness and specialist AI engineering, Europe offers very little at EQF 5 and 6 that joins AI competence to care practice, and almost nothing that is dementia-specific. Healthcare professionals at these levels, the majority of the care workforce, currently have no realistic educational route to the competences mapped in Section 3. The partner-country evidence of Section 4 shows the same void in all four national systems, which is what makes the gaps genuinely European rather than local. Read from the working-life side, the void is structural rather than accidental: it lies between the level at which vocational care education stops (EQF 4) and the level at which university provision begins (EQF 6–7), which is why the response has to be built from both sides at once (Step A, Section 4.5).

From listing to comparing. To turn the reference picture into the comparison of competence requirements that the Grant Agreement commits UPV to deliver, thirteen European offerings were benchmarked one by one against the five thematic areas and against dementia specificity, from their officially published programme descriptions (all sources accessed August 2026; full matrix, ratings and sources in Annex B, Table 15 and Figure 11). The set spans eight countries (FI, ES, NL, PT, BE, SE, DE, MT), the EQF range from higher VET to Master's level, and open population-scale provision. Read by thematic area, the comparison gives five results.

- **Area 1, AI-based assistive technology.** Integrated AI requirements exist only at the specialist pole (KU Leuven; UvA's AI for Health track with deep learning, language processing and imaging on clinical tasks; the Heidelberg–Heilbronn data-science profile). The health-informatics Master's family (Karolinska Institutet; the Universidade do Porto; the University of Eastern Finland, UEF; the Universitat Oberta de Catalunya, UOC) requires informatics and decision support but treats AI as partial, elective or emerging. Below EQF 7 the requirement disappears, and no programme anywhere in the set requires assistive-AI competence in a dementia context.
- **Area 2, development of innovations.** Project- and thesis-based work is standard at EQF 6 and 7 (design projects in Clinical Technology, real-case work at UvA), but structured innovation-method requirements are rare, and the Spanish higher-VET AI specialisation contains none.
- **Area 3, entrepreneurship.** Explicit only as electives (Karolinska's digital-society entrepreneurship course; the UOC's eSalud business-models course). The 73.5%

absence that D4.1 measured inside the consortium is therefore the European norm, not a local anomaly.

- **Area 4, sustainability.** The emptiest column of the matrix: not one benchmarked programme states sustainable-AI, green-computing or footprint requirements. Only policy-and-ethics variants (University of Malta) come near. This is the strongest external confirmation of gap G4.
- **Area 5, digital literacy.** At EQF 7 digital competence is assumed at entry rather than taught; population-scale AI literacy exists and works (Elements of AI, free, more than two million enrolled learners across Europe), but it is generic; and the organisational AI-literacy duty of Article 4 of the AI Act has no curricular counterpart anywhere in the benchmarked set.

Two verified negatives complete the benchmark.

First, no offering at EQF 5 or 6 in any partner country joins AI competence with care practice. Spain's Curso de especialización en Inteligencia Artificial y Big Data (Real Decreto 279/2021, 600 hours) proves that substantial AI content is feasible inside higher VET, yet its access routes are reserved to ICT and industrial Técnico Superior holders: the door that health-family graduates would need does not exist.

Second, no programme at any level was found that combines AI competence with MCI and dementia care. The nearest neighbours split the target between them: KU Leuven teaches AI without dementia, and the University of Malta's MA in Ageing and Dementia Studies teaches dementia care with assistive-technology awareness but no AI. The cell that DETECT 2.0 occupies is, on current evidence, empty in Europe.

5.3 Seven cross-cutting gaps

Consolidating the D4.1 measurements, the country readings and the benchmark, seven gaps recur across all four countries and both tracks. They are labelled G1 to G7, the code used for them in Figure 8, Table 13 and the response lines of Section 6. Each is stated with its principal evidence. Figure 8 presents the seven gaps at a glance. In the Step A check, the consortium's working-life partners recognised the seven gaps, 't Heem finding them consistent with daily long-term care practice (Section 4.5 and Annex C).

- **G1. AI fundamentals are absent from healthcare curricula.** 82.4% of programmes teach no or only superficial content on AI-based assistive technology and none teaches it in depth; in VET healthcare, 63.2% of programmes stay at the superficial level. The care workforce's core training pathway contains essentially no structured AI content (D4.1 dataset, Q8; Section 2.3).
- **G2. MCI- and dementia-specific AI application is missing almost everywhere.** 70.6% of programmes have no dementia-specific focus and only 5.9% a dedicated module or topic; the technologies that matter most for MCI and early dementia (patient monitoring, support for daily living, cognitive training,

communication tools) are explicitly taught in only a quarter to a third of programmes, almost exclusively on the care side, and no ICT programme has any dementia focus (D4.1 dataset, Q9 and Q10; Section 2.3).

- **G3. Educators lack AI expertise and structured professional development.** Lack of teacher expertise and training is the most cited barrier in the open responses (14 of the 22 educators who answered, 63.6%), and 64.7% of educators are not, or only slightly, confident that their graduates can use AI-driven tools effectively and responsibly (79.2% in VET). The teacher, before the student, is the binding constraint (D4.1 dataset, Q22 and Q27; Komssi, Pöntiö & Ferri-Mollá, 2026).
- **G4. Ethics, data protection and sustainability are taught abstractly, where taught at all.** Ethical considerations of AI are explicitly taught in 29.4% of programmes; data privacy and security principles are the most widespread digital skill taught (64.7%) but as generic data handling; green or sustainable AI is addressed in 11.8%; sustainability integration averages 2.2 of 5; clinical-context ethics (bias in care decisions, consent under cognitive impairment) is essentially untaught (D4.1 dataset, Q10, Q18, Q19 and Q21).
- **G5. Innovation practice and entrepreneurship are detached from care education.** 82.4% of programmes run no novel development projects; prototyping receives no emphasis in 44.1% and identifying unmet clinical needs none in 47.1%; 73.5% include no health-tech entrepreneurship content (D4.1 dataset, Q13 to Q15).
- **G6. Healthcare and ICT education run in silos.** Only 14.7% of programmes place moderate or strong emphasis on interdisciplinary healthcare–ICT collaboration and half place none; the two fields hold complementary halves of the needed competence and no shared space to combine them (D4.1 dataset, Q13; Section 2.3; qualitative material).
- **G7. Provision is not aligned with European frameworks and new legal duties.** The AI literacy that Article 4 of the AI Act requires of deploying organisations has no counterpart in current curricula: fewer than four programmes in ten formally teach and assess the use of AI-driven interfaces (38.2%) or the identification of bias in AI recommendations (35.3%), none of the programmes examined in Section 4 is built on an AI-specific competence framework, and micro-credential vehicles exist in national systems (notably ES and FI) but are not used for AI-in-care content (D4.1 dataset, Q21; Sections 4 and 5.2).

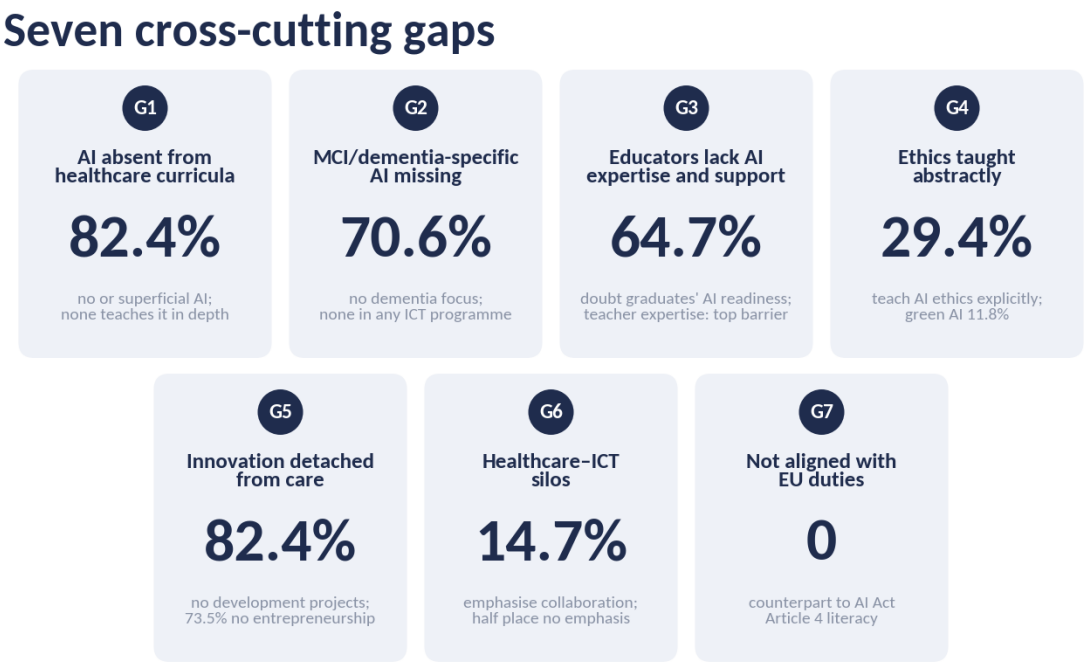


Figure 8. The seven cross-cutting gaps (G1–G7) with headline evidence. Source: D4.1 and Section 5.

5.4 The European gaps matrix

The matrix condenses the seven gaps into the steering table for the rest of WP4. Severity combines the size of the affected population with the depth of the deficit. Validation status records the outcome of Step A (Section 4.5).

Gap	Thematic area(s)	EQF	Track most affected	Severity	Validation status	DETECT 2.0 response
G1 AI fundamentals absent in healthcare	1, 5	4–6	VET healthcare	Critical	Survey-evidenced; Step A: recognised ('t Heem, Macomi)	R2 modular units; R1 train-the-trainer (→ T4.3, T4.4)
G2 Dementia-specific AI missing	1	5–7	Both tracks	Critical	Survey-evidenced; needs camp (2 Jun) aligned; Step A: recognised	R2 AI-and-MCI modules (→ T4.3, T4.4); WP3 scenarios
G3 Educator capability gap	5, 1	n/a (educators)	Both, strongest VET	Critical	Survey-evidenced; Step A: recognised	R1 train-the-trainer (→ T4.4; DigCompEdu-aligned)
G4 Ethics and sustainability abstract	4, 1	4–7	Both tracks	High	Survey-evidenced; Step A: recognised	R6 transversal ethics and sustainability design rule
G5 Innovation and entrepreneurship detached	2, 3	4–7	Healthcare, both tracks	High	Survey-evidenced; Step A: recognised	R3 cross-domain labs; R5 embedded entrepreneurship; WP3 hackathons
G6 Healthcare–ICT silos	2, 5	4–7	Both tracks	High	Survey-evidenced; Step A: recognised	R3 cross-domain labs; WP3 mixed teams

G7 Framework and legal misalignment	5, 4	5–7	Both tracks; employers	High and rising	Benchmark-evidenced; Step A: recognised	R2/R4 EQF-referenced micro-credentials; map anchored to DigComp, EntreComp, GreenComp, AI Act Art. 4

Table 13. European gaps matrix. G1 to G7 are the cross-cutting gaps defined in Section 5.3; R1 to R6 are the response lines of Section 6; T4.3 and T4.4 are the downstream WP4 tasks.

6. Response framework

The response framework states what the consortium will do about the gaps. It is a design **commitment for T4.3** (preliminary drafts of updated curricula) **and T4.4** (digital educational materials), presented to the consortium at the Annual Partner Meeting in Breda (22–23 September 2026) as the frame from which the drafting of curricula starts in October 2026, rather than from an open question. The framework is organised as six response lines — coherent packages of curricular action, labelled R1 to R6, the codes used in Table 13, Table 14 and Figure 9 — each designed to close one or more of the seven gaps (G1–G7) identified in Section 5.3.

6.1 Design principles

Five principles govern the response. **Modularity**: content is built as self-contained units insertable into existing programmes, because the D4.1 barrier analysis shows dense curricula and rigid structures (lack of time and the pace of technological change are cited by 27.3%, and curriculum structures that leave no room for new content by 22.7%, of the educators who described barriers; Section 2.4) that make whole-programme redesign unrealistic in the project's horizon. **Competence-based design**: every unit states learning outcomes in the knowledge, skills and attitudes grammar of Section 3, referenced to EQF levels, so that HEI and VET can share materials while assessing at their own level. **Micro-credential readiness**: units follow the Council Recommendation's elements (workload, learning outcomes, assessment, stackability) so partners can issue them through their national vehicles, including Spain's FP micro-accreditations. **Work-based and experiential learning**: the WP3 hackathons and ecosystem pilots are the practice ground, per the project's iterative method. **Multilingualism and openness**: materials in English, Finnish, Dutch, Spanish (and Portuguese where partners can support it), published openly through the T4.5 library with AI-assisted delivery.

6.2 Six response lines

Table 14 presents the six lines. Each row names the response, the gaps it addresses (G codes from Section 5.3), the main output and the WP4 task where it lands, and the KPI it serves.

Line	Response	Gaps addressed	Main output (task)	KPI served
R1	Train-the-trainer programme for educators, differentiated VET (hands-on AI tool use, EQF 4–5 teaching contexts) and HEI (research-informed AI integration, EQF 6–7); DigCompEdu-aligned	G3, G1	Professional development modules (T4.4)	40 materials; 5 curricula
R2	Foundational AI-and-MCI curriculum modules combining AI literacy with MCI and dementia care application: cases,	G1, G2, G7	Modular units and curricula drafts (T4.3, T4.4)	5 curricula; 40 materials

	simulations, assistive technology demonstrations			
R3	Cross-domain integration labs: structured joint coursework where healthcare and ICT students solve real assistive technology challenges together, hackathon-linked	G5, G6	Lab format and scenarios (T4.3; WP3)	Hackathon skills target 80%
R4	Multilingual open educational resources with AI-assisted delivery (tutoring, translation, recommendation), EQF- and DigComp-referenced	G1, G3, G7	OER set in the online library (T4.4, T4.5)	40 materials; 1 library
R5	Entrepreneurship and innovation methods embedded inside health technology modules (EntreComp-based), rather than standalone electives	G5	Embedded content in units (T4.3, T4.4)	5 curricula
R6	Ethics and sustainability as a transversal design rule: every unit includes clinical-context ethics, data protection practice and footprint awareness (GreenComp-based)	G4, G7	Design rule applied across all outputs	All

Table 14. Response framework: six lines from gaps to WP4 outputs.

Priority follows severity and leverage. R1 comes first: with teacher expertise the most cited barrier and 64.7% of educators doubting their graduates' AI readiness, no other line can succeed until the people who teach are equipped, which is why train-the-trainer was already flagged as the first proposed action in the D4.1 conclusions. R2 carries the project's distinctive content. R3 exploits the exploration hackathon of September 2026 and the prototyping hackathon that runs as this version is issued (28 September to 2 October 2026) as the immediate instantiation of interdisciplinary learning. The remaining lines run through T4.4's production cycle. Figure 9 maps the six lines to the gaps they address and the outputs they produce.

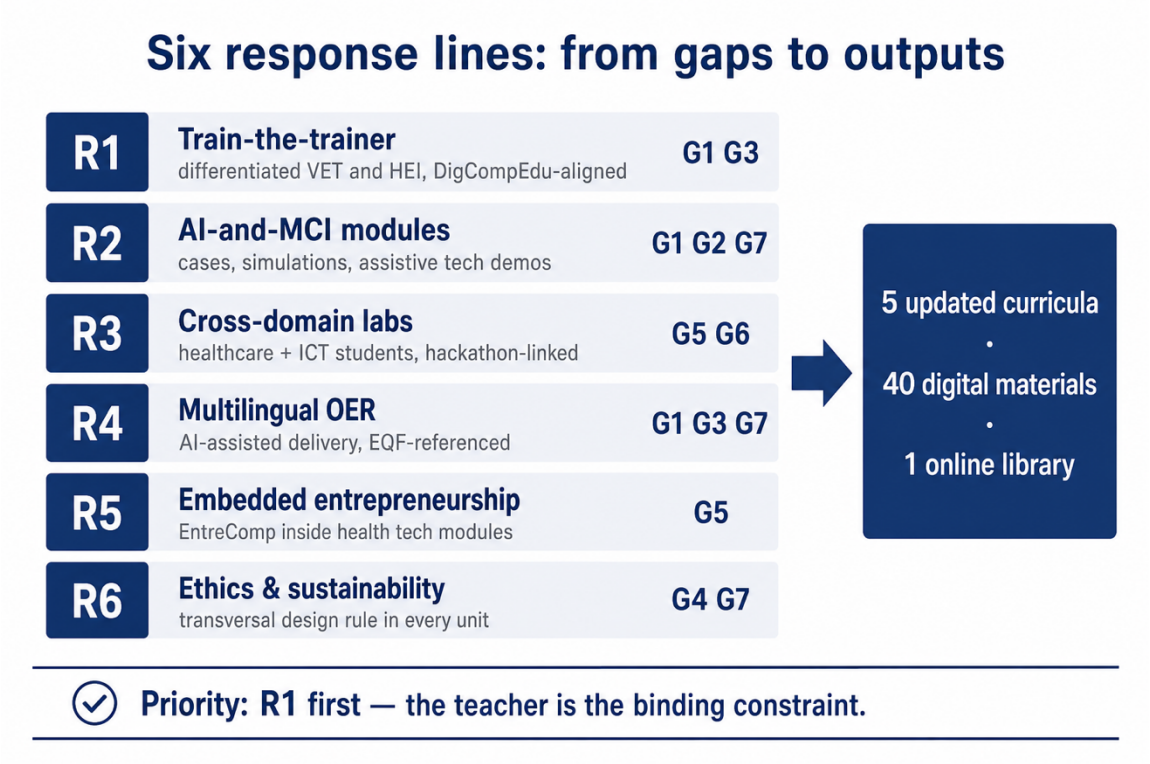


Figure 9. The six response lines mapped to gaps and WP4 outputs.

6.3 Hand-off to T4.3 and T4.4

T4.3 receives from this deliverable: the competence map (Section 3) as its learning outcome inventory; the gaps matrix (Section 5.4) as its prioritisation; the response lines (Table 14) as its design frame; and the country sections as its localisation guide.

Per the Grant Agreement, T4.3 drafts will also incorporate WP2 ecosystem feedback (T2.3 reviews), the WP3 pre- and post-survey results, and the requirements of Directives 2005/36/EC and 2013/55/EU for regulated professions, and will be reviewed with student focus groups in each country before finalisation.

T4.4 uses the same inputs to co-develop the forty digital educational materials with multidisciplinary teams and regional industry workshops, peer-reviewed within the WP2 ecosystem. The sequencing: T4.3 outline work starts in October 2026, immediately consuming this deliverable and the first hackathon's results.

7. Implications for WP3 and WP5

D4.2 is written to be used by the neighbouring work packages, in both directions.

7.1 Implications for WP3 (hackathons and piloting)

The exploration hackathon (7 to 11 September 2026) was the first live test of this deliverable's content; the prototyping hackathon (28 September to 2 October 2026) runs as this version is issued.

Four uses follow. **First**, the competence map supplies the learning outcome frame against which hackathon activities can be read: Area 2 competences (2.5 to 2.8) describe what participating students should demonstrably exercise, and the jury's evaluation criteria for solution ideas can be cross-referenced to them. **Second**, the pre- and post-surveys that measure the project's 80% skills improvement KPI can draw their item structure from the map's areas, so that measured improvement is interpretable as competence gain rather than generic satisfaction. **Third**, the gaps matrix gives hackathon scenario designers the evidence for problem framing: scenarios that sit inside G2 (dementia-specific AI application) exercise exactly the void the analysis identifies. In return, WP3 sends back the survey results and the observed competence demonstrations as inputs to T4.3, closing the loop the Grant Agreement designs. **Fourth**, the selection of the prototypes carried to high fidelity (T3.3) should, across the hackathon cycles, include work originating from VET teams as well as from HEI teams: the EQF 5–6 void of Section 5.2 lies between the two systems and has to be worked from both sides, and both student groups should see that their ideas are taken forward (proposal of Macomi in the September 2026 review, Annex C).

7.2 Implications for WP5 (dissemination) and quality assurance

D4.2 is a public deliverable and should be treated as a dissemination asset. The natural sequence: publication on the project website next to D4.1; a summary item in the project newsletter; coordinated LinkedIn communication by partners, anchored on the already published LAB RDI Journal article, which gives external credibility to the same evidence base; and the presentation of the deliverable at the Breda Annual Meeting and Ecosystem Day (22–23 September 2026), where the ecosystem audience overlapped with the Step A validation population.

For quality assurance, this deliverable reports against the WP4 KPI set (Annex E of the internal action plan): the KPI table and its current status are included in Annex D of this document, so that the PMC and the QA team can verify compliance directly.

8. Conclusions and next steps

Six conclusions follow from the analysis.

- **The gap is measured, published and European.** 82.4% of surveyed programmes lack meaningful AI content and 70.6% lack dementia content, across four countries, with the analysis peer-reviewed in the LAB RDI Journal.
- **The binding constraint is the educator, before the student.** Lack of teacher expertise is the barrier educators cite most, and 64.7% doubt their graduates' AI readiness; no response line can succeed until the people who teach are equipped.
- **The deficit is symmetrical.** Care education lacks AI; AI education lacks care. Interdisciplinarity is the mechanism, and today it is nearly absent (14.7%).
- **Europe's frameworks and law are ahead of Europe's classrooms.** The AI Act's literacy duty and the EU competence frameworks already define much of the target competence; provision joining AI and care at EQF 5 and 6 barely exists, and no European programme combines AI with MCI and dementia care.
- **The competence map is the reusable artefact.** More than sixty entries, EQF-referenced, evidence-traced, ready to become curricula (T4.3), materials (T4.4) and evaluation frames (WP3).
- **The response is defined and proportionate.** Six lines, led by train-the-trainer and modular AI-and-MCI units, delivered as micro-credential-ready modules rather than whole-programme redesign.

For institutions beyond the consortium, the practical advice is to audit programmes against the competence map, invest first in educator development and use micro-credentials to move inside regulated professions. For policy makers, the most underused insertion point is the EQF 5 layer, and the AI literacy duty of Article 4 will reach care providers before initial education adapts: continuing education needs funding now.

From v0.99 to v1.0, and next steps. The partner review ran through the margin comments of the review draft and by email. The comments received from LAB (14 September), Vision Factory (16 and 23 September), Curio (21 September), 't Heem (21 September) and Macomi (25 September) are integrated in this final version, the pre-final version was discussed at the Annual Partner Meeting in Breda on 22 and 23 September, and v1.0 adds the Step A record (Section 4.5, Annex C), closes the review (Annex E) and is submitted to EACEA on 30 September 2026 (Month 11), closing Milestone 5. Figure 10 summarises the path. The next steps are fixed: T4.3 starts in October 2026 from the competence map, the gaps matrix and the response lines; the T4.3 drafts are validated with the ecosystem actors through the Annex C form at the next WP2 camp; the WP3 prototyping results and pre- and post-surveys feed the same drafts; and progress against the gaps matrix is reported to the PMC as the standing WP4 agenda.



Figure 10. The path to submission: partner review, freeze, presentation in Breda and submission to EACEA (Month 11, Milestone 5).

References

Alzheimer Europe (2025). Prevalence of dementia in Europe. Luxembourg: Alzheimer Europe. https://www.alzheimer-europe.org/dementia/prevalence-dementia-europe

Alzheimer's Disease International (2019). World Alzheimer Report 2019: Attitudes to dementia. London: ADI. https://www.alzint.org/resource/world-alzheimer-report-2019/

Bacigalupo, M., Kampylis, P., Punie, Y. & Van den Brande, G. (2016). EntreComp: The Entrepreneurship Competence Framework. EUR 27939 EN. Luxembourg: Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC101581

Bianchi, G., Pisiotis, U. & Cabrera, M. (2022). GreenComp: The European sustainability competence framework. EUR 30955 EN. Luxembourg: Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC128040

Boletín Oficial del Estado (2021). Real Decreto 279/2021, de 20 de abril, por el que se establece el Curso de especialización en Inteligencia Artificial y Big Data y se fijan los aspectos básicos del currículo. BOE-A-2021-7686. https://www.boe.es/diario_boe/txt.php?id=BOE-A-2021-7686

Cedefop (2025). Skills empower workers in the AI revolution: first findings from Cedefop's AI skills survey. Thessaloniki: Cedefop. https://www.cedefop.europa.eu/en/publications/9201

Council of the European Union (2017). Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning. OJ C 189. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017H0615(01)

Council of the European Union (2020). Council Recommendation of 24 November 2020 on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience (incorporating the EQAVET framework). OJ C 417. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020H1202(01)

Council of the European Union (2022). Council Recommendation of 16 June 2022 on a European approach to micro-credentials for lifelong learning and employability. OJ C 243. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022H0627(02)

Dawson, N., Williams, M.-A. & Rizoiu, M.-A. (2021). Skill-driven recommendations for job transition pathways. PLOS ONE, 16(8), e0254722. https://doi.org/10.1371/journal.pone.0254722

DETECT 2.0 Consortium (2025). Grant Agreement No. 101246390, DETECT 2.0 — Deep Tech Competence Enhancement for Digital Transition in Dementia Care. Call ERASMUS-EDU-2025-PI-ALL-INNO. Application Part B, WP4 description.

DETECT 2.0 Consortium (2026). Deliverable D4.1 — Curricula Analysis (WP4). April 2026. https://detect20.ipn.pt/

DETECT 2.0 WP2, Vision Factory (2026). Collecting Needs Camp: planning document, 6 May 2026. Internal project document, DETECT 2.0 repository.

DETECT 2.0 WP4 Lead Team (2026). Initial Proposal and Strategic Plan for Work Package 4: Modernizing Education for AI Skills in Healthcare. Internal WP4 proposal, UPV.

DETECT 2.0 WP4 Lead Team (2026). D4.2 Outline and Section Ownership (working document, June 2026); D4.2 Action Plan (May 2026). Internal WP4 documents, UPV.

European Brain Council (2023). Rethinking Alzheimer's disease: detection and diagnosis (White Paper, with EFPIA). Brussels: EBC. https://www.braincouncil.eu/projects/rethinking-alzheimers-disease/

European Commission (2020). European Skills Agenda for sustainable competitiveness, social fairness and resilience. COM(2020) 274 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0274

European Commission (2020). Digital Education Action Plan 2021–2027: Resetting education and training for the digital age. COM(2020) 624 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0624

European Commission, Directorate-General CONNECT (2025). AI talent, skills and literacy. https://digital-strategy.ec.europa.eu/en/policies/ai-talent-skills-and-literacy

European Commission & OECD (2026). Empowering Learners for the Age of AI: An AI Literacy Framework for Primary and Secondary Education (AILit Framework). Brussels/Paris: European Commission and OECD. https://ailiteracyframework.org/

European Institute of Innovation and Technology (2025). EIT Deep Tech Talent Initiative reaches one million talents trained. Press release, June 2025. https://www.eitdeeptechtalent.eu/

European Parliament and Council (2005; 2013). Directive 2005/36/EC on the recognition of professional qualifications, as amended by Directive 2013/55/EU. OJ L 255; OJ L 354. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32005L0036

European Parliament and Council (2022). Decision (EU) 2022/2481 establishing the Digital Decade Policy Programme 2030. OJ L 323. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022D2481

European Parliament and Council (2024). Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence (AI Act), Article 4 (AI literacy). OJ L, 2024/1689. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024R1689

European Parliament and Council (2025). Regulation (EU) 2025/327 on the European Health Data Space. OJ L, 2025/327. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32025R0327

Eurostat (2025). Towards Digital Decade targets for Europe: digital skills indicators. https://ec.europa.eu/eurostat/statistics-explained/

HealthyEurope (2024). Bridging the gap: Digital skills in health and care. Report; 61% of European health professionals report never having received dedicated digital skills training.

Hochschule Heilbronn & Universität Heidelberg (2026). Medizinische Informatik, joint Master's programme: programme description. https://www.hs-heilbronn.de/de/medizinische-informatik-master (accessed 19 August 2026).

Ienca, M., Fabrice, J., Elger, B., Caon, M., Scoccia Pappagallo, A., Kressig, R. W. & Wangmo, T. (2017). Intelligent assistive technology for Alzheimer's disease and other dementias: a systematic review. Journal of Alzheimer's Disease, 56(4), 1301–1340. https://doi.org/10.3233/JAD-161037

Kale, M., Wankhede, N., Pawar, R., et al. (2024). AI-driven innovations in Alzheimer's disease: Integrating early diagnosis, personalized treatment, and prognostic modelling. Ageing Research Reviews, 101, 102497. https://doi.org/10.1016/j.arr.2024.102497

Karolinska Institutet & Stockholm University (2026). Joint Master's Programme in Health Informatics: programme description. https://education.ki.se/bachelors-masters-studies/programmes-and-courses/joint-masters-programme-in-health-informatics (accessed 19 August 2026).

Komssi, S., Pöntiö, I. & Ferri-Mollá, I. (2026). Bridging the AI Skills Gap in Healthcare and ICT Education: A Curricular Gap Analysis Across European VET and HEI Institutions. LAB RDI Journal, 12 August 2026. https://www.labopen.fi/en/lab-rdi-journal/bridging-the-ai-skills-gap-in-healthcare-and-ict-education-a-curricular-gap-analysis-across-european-vet-and-hei-institutions/

KU Leuven (2026). Master of Artificial Intelligence: programme description. https://www.kuleuven.be/programmes/master-artificial-intelligence

Leiden–Delft–Erasmus Universities (2026). Clinical Technology (joint BSc) and Technical Medicine (MSc): programme description. https://www.leiden-delft-erasmus.nl/en/education/bachelors-degree-programmes/bachelor-clinical-technology (accessed 19 August 2026).

Machleid, F., Kaczmarczyk, R., Johann, D., Balčiūnas, J., Atienza-Carbonell, B., von Maltzahn, F. & Mosch, L. (2020). Perceptions of digital health education among European medical students: mixed methods survey. Journal of Medical Internet Research, 22(8), e19827. https://doi.org/10.2196/19827

McKinsey & Company (2020). Transforming healthcare with AI: the impact on the workforce and organisations (with EIT Health). Brussels/London. https://eithealth.eu/our-achievements/our-reports/report-transforming-healthcare-with-ai/

Miao, F. & Cukurova, M. (2024). AI competency framework for teachers. Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000391104

Miao, F. & Shiohira, K. (2024). AI competency framework for students. Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000391105

Nguyen-Truong, C. K. Y. & Fritz, R. L. (2018). Health-assistive smart homes for aging in place: leading the way for integration of the Asian immigrant minority voice. Asian/Pacific Island Nursing Journal, 3(4), 154–159. https://doi.org/10.31372/20180304.1087

Punie, Y. & Redecker, C. (2017). European Framework for the Digital Competence of Educators: DigCompEdu. EUR 28775 EN. Luxembourg: Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC107466

Ruksakulpiwat, S., Thorngthip, S., Niyomyart, A., et al. (2024). A systematic review of the application of artificial intelligence in nursing care: Where are we, and what's next? Journal of Multidisciplinary Healthcare, 17, 1603–1616. https://doi.org/10.2147/JMDH.S459946

Satakunta University of Applied Sciences, SAMK (2026). Welfare Technology, Master's degree (YAMK): programme information; national listing in Opintopolku. https://www.samk.fi/en/education/master-degree/welfare-technology/ (accessed 19 August 2026).

Sidhu, G., Sayem, M., Taslima, N., Anwar, A., Chowdhury, F. & Rowshon, M. (2024). AI and workforce development: A comparative analysis of skill gaps and training needs in emerging economies. International Journal of Business and Management Sciences, 4(8). https://doi.org/10.55640/ijbms-04-08-03

Sorrentino, M., Fiorilla, C., Mercogliano, M., et al. (2024). Technological interventions in European dementia care: A systematic review of acceptance and attitudes among people living with dementia, caregivers, and healthcare workers. Frontiers in Neurology, 15, 1474336. https://doi.org/10.3389/fneur.2024.1474336

Sriharan, A., Sekercioglu, N., Mitchell, C., et al. (2024). Leadership for AI transformation in health care organization: Scoping review. Journal of Medical Internet Research, 26, e54556. https://doi.org/10.2196/54556

Universidade do Porto, Faculdade de Medicina (2026). Master in Health / Medical Informatics (EFMI-accredited, 2022): programme description. https://mis.med.up.pt/en/ (accessed 19 August 2026).

Universitat Oberta de Catalunya (2026). Máster universitario de Salud Digital (eHealth), 60 ECTS: programme description. https://www.uoc.edu/es/estudios/masters/master-universitario-salud-digital (accessed 19 August 2026).

University of Amsterdam (2026). MSc Medical Informatics, AI for Health track: programme description. https://www.uva.nl/en/programmes/masters/medical-informatics-ai-for-health/

University of Eastern Finland (2026). Health and Human Services Informatics, Master's studies, Department of Health and Social Management (Kuopio). https://www.uef.fi/en/unit/department-of-health-and-social-management (accessed 19 August 2026).

University of Helsinki & MinnaLearn (2026). Elements of AI: a free online introduction to artificial intelligence. https://www.elementsofai.com/

University of Malta (2026). Master of Arts in Ageing and Dementia Studies (MQF 7, 90 ECTS): course overview. https://www.um.edu.mt/courses/overview/pmaadsptb4-2024-5-f/ (accessed 19 August 2026).

van Haeften, W., Zhang, R., Boesen-Mariani, S., Lub, X., Ravesteijn, P. & Aertsen, P. (2024). Bridging the AI skills gap in Europe: A detailed analysis of AI skills and roles. In Proceedings of the 37th Bled eConference. Maribor University Press, 385–402. https://doi.org/10.18690/um.fov.4.2024.22

Vuorikari, R., Kluzer, S. & Punie, Y. (2022). DigComp 2.2: The Digital Competence Framework for Citizens, with new examples of knowledge, skills and attitudes. EUR 31006 EN, JRC128415. Luxembourg: Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC128415

World Health Organization (2021; guidance updated 2024). Ethics and governance of artificial intelligence for health. Geneva: WHO. https://www.who.int/publications/i/item/9789240029200

World Health Organization Regional Office for Europe (2026). Artificial intelligence is reshaping health systems: state of readiness across the European Union. Copenhagen: WHO Regional Office for Europe. https://www.who.int/europe/news/item/20-04-2026-new-who-europe-report-provides-first-ever-snapshot-of-ai-in-health-care-across-european-union-member-states

Zahlan, A., Ranjan, R. P. & Hayes, D. (2023). Artificial intelligence innovation in healthcare: literature review, exploratory analysis, and future research. Technology in Society, 74, 102321. https://doi.org/10.1016/j.techsoc.2023.102321

Annexes

Annex A D4.1 survey instrument and sample summary

The Task 4.1 instrument, “Developing AI skills in healthcare education”, was a Microsoft Forms questionnaire of 28 questions in three parts: respondent and programme profile (Q1–Q7); five thematic blocks mirroring the WP4 areas, namely utilisation of AI-based assistive technology (Q8–Q11), development of innovation (Q12–Q14), entrepreneurship (Q15–Q17), sustainability related to healthcare and technology (Q18–Q20) and digital literacy and readiness (Q21–Q22); and a forward-looking section on perceived gaps, challenges and future needs (Q23–Q28). Closed items used four- and five-point scales, yes/no and multi-select options; eight items were open text.

It was administered in February and March 2026 and collected 34 valid responses from four institutions (Table 1). Programmes represented span EQF levels 4 to 7 in healthcare and ICT: practical nurse, social and health care and ICT technician qualifications on the VET side; nursing, physiotherapy, information technology, computer engineering, data science and AI applications on the HEI side. The respondent-declared institution type (24 VET, 10 HEI) differs from the institutional count (23, 11) by one Master’s-level UPV respondent who ticked VET; the analysis follows the respondent classification, as does the peer-reviewed article.

The full dataset (Forms export) and the analysis workbook are available in the project repository. **Every figure quoted in Section 2 was recomputed from the export for this version; where the D4.1 report and the recount differ, the recount is used.** The map below shows where each headline figure comes from.

- **82.4% no or superficial AI.** Q8, coverage of AI-based assistive technology in healthcare: “Not at all” 12 + “Superficially” 16 of 34; “Moderately” 6 (17.6%), “In-depth” 0.
- **70.6% no dementia focus; 5.9% dedicated module.** Q9, application in dementia care: 24, 8 (minor case studies, 23.5%) and 2 of 34.
- **Technologies explicitly taught.** Q10, multi-select; percentages of the 34 respondents (patient monitoring 11, daily-living support 10, ethics of AI 10, virtual assistants 9, cognitive training 9, generative AI 9, communication tools 8, clinical decision support 2, none 12).
- **Innovation emphasis; 14.7% interdisciplinary collaboration.** Q13, four items on a four-point scale; “moderate” or “strong” emphasis on interdisciplinary collaboration 5 of 34, “no emphasis” 17.
- **82.4% no novel-solution projects.** Q14: “No” 28 of 34.
- **73.5% no health-tech entrepreneurship content; 79.4% no topic.** Q15: “No” 25 of 34; Q16, multi-select: “None of the above” 27.

- **Sustainability 2.2 of 5; green AI 11.8%.** Q18, mean of 33 answers on a 1–5 scale; Q19: "Yes" 4, "Partially" 12, "No" 18.
- **Digital skills; 20.6% none.** Q21, multi-select: data privacy and security 22, AI interfaces 13, bias identification 12, clinical data interpretation 7, "None of the above" 7.
- **64.7% not or only slightly confident in graduates' AI readiness.** Q22: "Not confident" 5 + "Slightly confident" 17 of 34; by respondent-declared type 19 of 24 VET (79.2%) and 3 of 10 HEI (30.0%).
- **Barriers and requested topics.** Thematic coding of the open answers to Q27 (22 answers) and Q28 (18 answers), as in the analysis workbook and the peer-reviewed article.

Annex B European reference programmes: consolidated starter list

The benchmark set comprises **thirteen external European offerings across eight countries** (Finland, Spain, the Netherlands, Portugal, Belgium, Sweden, Germany, Malta) plus EU-wide open and CPD provision, compared with the consortium's own base recorded in Tables 9 to 12 (now twenty-one national entries).

Every rating in Table 15 derives from the programme's officially published description, all sources accessed on **19 August 2026** and listed in the References; ratings marked * were assigned from the published description alone, where the provider's site limited inspection; they stand unchanged after the partner review and remain open to correction in T4.3. Reading key: ●●● integrated requirement · ●● module-level · ● awareness · — absent.

Programme (country)	Level	Area 1 AI-assistive	Area 2 Innovation	Area 3 Entrepr.	Area 4 Sustain.	Area 5 Digital	MCI / dementia	Source
Master of Artificial Intelligence — KU Leuven (BE)*	EQF 7	●●●	●●	●	●	●●●	—	KU Leuven (2026)
MSc Medical Informatics, AI for Health track — Univ. of Amsterdam / Amsterdam UMC (NL)	EQF 7	●●●	●●	—	—	●●●	—	University of Amsterdam (2026)
Medizinische Informatik, joint Master — Heidelberg Univ. + HS Heilbronn (DE)	EQF 7	●●●	●●	—	—	●●●	—	HS Heilbronn & Univ. Heidelberg (2026)
Joint Master's in Health Informatics — Karolinska Institutet + Stockholm Univ. (SE)	EQF 7	●●	●●	●●	—	●●●	—	Karolinska Institutet & SU (2026)
Master in Health / Medical Informatics, EFMI-accredited — Univ. of Porto, FMUP (PT)	EQF 7	●●	●	—	—	●●●	—	Universidade do Porto (2026)
Máster universitario de Salud Digital / eHealth — UOC (ES)	EQF 7	●●	●●	●●	—	●●●	—	UOC (2026)
Health and Human Services Informatics — Univ. of Eastern Finland (FI)	EQF 7	●	●	—	—	●●●	—	University of Eastern Finland (2026)
Welfare Technology, YAMK Master — SAMK (FI)*	EQF 7	●●	●●	●	●	●●	●	SAMK (2026)

Programme (country)	Level	Area 1 AI-assistive	Area 2 Innovation	Area 3 Entrepr.	Area 4 Sustain.	Area 5 Digital	MCI / dementia	Source
MA Ageing and Dementia Studies — Univ. of Malta (MT)	EQF 7	●	●	—	●	●	●●●	University of Malta (2026)
Clinical Technology BSc / Technical Medicine MSc — Leiden–Delft–Erasmus (NL)*	EQF 6–7	●●	●●	●	—	●●	—	Leiden–Delft–Erasmus (2026)
Curso de especialización en IA y Big Data, higher VET — FP system (ES)	Higher VET (post-EQF 5)	●●	●	—	—	●●●	—	BOE, RD 279/2021
Elements of AI, open national course — Univ. of Helsinki + MinnaLearn (FI / EU-wide)	Open (non-EQF)	●	—	—	—	●●	—	University of Helsinki & MinnaLearn (2026)
EIT Deep Tech Talent Initiative course portfolio (EU, CPD)	CPD (non-EQF)	●●	●●	●●	●	●●	—	EIT (2025)

*Table 15. European benchmark of competence requirements at EQF 5–7 (Step B): coverage of the five DETECT 2.0 thematic areas and of MCI/dementia specificity in thirteen external European offerings. Ratings from officially published programme descriptions, accessed 19 August 2026; * rated from the published description alone; unchanged after the partner review.*

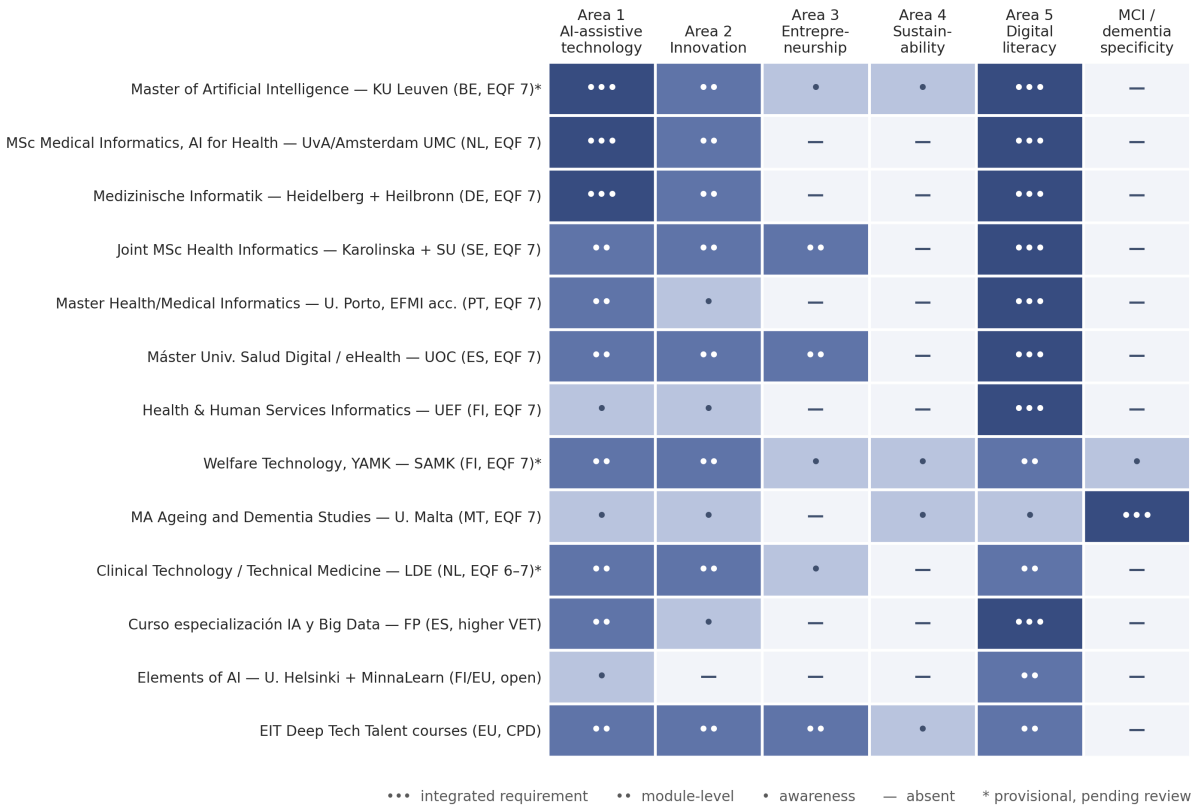


Figure 11. The benchmark at a glance: the near-empty MCI/dementia column and the absent sustainability column are the void DETECT 2.0 addresses. Source: Table 15.

Annex C Step A industry validation: record and written validation track

Status. The first WP2 T2.2 camp (“Collecting the Needs Camp”) was held online on 2 June 2026, 09:00–11:00 CET, with fifteen ecosystem actors and the project group; organisation Laura Väisänen (Vision Factory), content design Krista Keränen (Vision Factory); UPV

session “Unlocking the Power of AI in Development” delivered by Isabel Ferri-Mollá. The camp addressed end-user needs around MCI and early-stage dementia. Its consolidated outputs were not available to WP4 before the freeze of this deliverable; the session recording is archived in the project repository. The Evaluation Camp of 17 September 2026 was a hackathon jury session and was out of scope for gap validation.

Camp design. The camp followed a staged design (DETECT 2.0 WP2, 2026): three short inspirational inputs (human-centric design; design thinking and service design as an approach, by Vision Factory with Avans; and the UPV session on the possibilities of AI in development), followed by a needs-collection workshop in which Vision Factory introduced the preliminary needs identified in earlier research and participants worked in facilitated small groups, in local languages where needed, with facilitators reporting back and a closing joint discussion in English. The session pursued three aims: collecting insights and end users' needs from participants, exploring how AI can support and respond to those needs, and strengthening collaboration across the ecosystem.

A methodological note from the camp planning is directly relevant to T4.3 and to WP3 scenario design: people with early-stage dementia who still live at home regularly attend day activities at care centres, so care centres offer a safe and neutral environment in which to hold dialogues about their needs at home. This framing, agreed at the planning session of 6 May 2026, positions the ecosystem's care centres as the natural setting for future validation and piloting activities.

Step A record (v1.0). Step A was closed on three sources, read together against the seven gaps of Section 5.3 and the response lines of Section 6: the camp material, the partner review and the Breda plenary.

Camp material. The 2 June 2026 camp was scoped to the needs of end users around MCI and early-stage dementia, included the UPV session on the possibilities of AI in development, and its planning fixed the care-centre setting as the natural place for dialogue with people who still live at home. Read against the gaps, this material confirms the end-user orientation of the competence map and sits inside G2 (dementia-specific application), G4 (ethics in clinical context) and G6 (care and technology actors working together). It does not allow an item-by-item comparison of working-life gaps, which is why the written form below is carried over to T4.3.

Partner review as ecosystem check. Four written contributions were received on v0.99, after the LAB and Vision Factory reviews already integrated at that version. ’t Heem (Tessa van de Kar, 21 September 2026), as a long-term care provider, recognised the findings and the identified competence gaps from daily practice: digital technologies and AI-related applications are increasingly relevant in care while many healthcare professionals are still developing the knowledge and skills to use them confidently and responsibly; AI-related competences need stronger integration in healthcare education programmes, connected with person-centred dementia care; and future professionals will need, beyond technical

and digital competences, the ability to critically assess AI-supported insights, to address ethical considerations and to keep the needs and preferences of people living with dementia and their families central. Curio (Dorien Duindam, 21 September 2026) confirmed the Dutch VET reading of Section 4.3 and Table 11 with no additions, without assessing the university part. Vision Factory (Krista Keränen, 23 September 2026) confirmed that the six-question form will be incorporated in the planning of the next ecosystem camp. Macomi (Cornelis Versteegt, 25 September 2026) found the report very good and read the EQF 5–6 void as a natural gap between VET (EQF 4) and university provision (EQF 6–7), proposing that the prototypes carried to high fidelity in WP3 include work from both VET and HEI students, so that the project works on both sides of the gap and both student groups see their ideas taken seriously (taken up in Section 7.1).

Breda plenary. The pre-final version was presented and discussed at the Annual Partner Meeting in Breda on 22 September 2026, with the working-life partners present; the written contributions above, received in the same week, are the documented outcome of that check. Tredu, Avans and IPN raised no corrections to their sections within the review window.

Outcome. The seven gaps stand as stated in Section 5.3, the validation column of Table 13 records them as recognised in the Step A check, and the response framework of Section 6 stands as the frame for T4.3. Two points from the check are carried into the text: the emphasis on the critical assessment of AI-supported insights and on the needs and preferences of people with dementia and their families (Section 3.7; map entries 1.8, 1.9, 1.13 and 1.14), and the VET and HEI balance in the selection of high-fidelity prototypes (Section 7.1).

Written validation track (carried over to T4.3). The six-question form below (approximately fifteen minutes) was drafted by UPV in August 2026 as a fallback for completing Step A independently of event minutes. It was not circulated before the freeze of this deliverable; on 23 September 2026 Vision Factory confirmed that it will be incorporated in the planning of the next ecosystem camp, where it validates the T4.3 curricula drafts with the ecosystem actors of all four countries. The form:

1. In your working environment, which of the seven gaps G1–G7 (summarised on one page attached to the form) do you recognise as real barriers today? Mark all that apply.

2. Which single gap, if closed, would most improve AI-supported care for people with MCI or early dementia in your organisation?

3. Are any important working-life gaps missing from the list? Please describe briefly.

4. For your sector, which competences of the map (one-page extract attached) should new VET graduates demonstrably have on day one? Name up to five.

5. The same question for new HEI graduates.

6. Would your organisation host or mentor student innovation work (hackathons, labs, pilots) in 2027? If yes, whom should we contact?

Annex D KPI compliance status

KPI (internal action plan)	Target	Status in v1.0
Submission by 30/09/2026 (M11)	Yes	Met: v1.0 issued and submitted on 30/09/2026 (M11)
Partner countries represented	4 (FI, ES, NL, PT)	Met (Section 4); FI confirmed by LAB (14/09/2026); NL VET reading confirmed by Curio (21/09/2026); NL HBO and PT readings drafted from public documentation and discussed at Breda (22–23/09/2026), no corrections received
Thematic areas covered	5	Met (Sections 3 and 5)
EQF levels in European benchmark	5–7 (EQF 4 for VET continuity)	Met (Sections 3 to 5)
European reference programmes benchmarked	≥ 12 (≥ 3 per country)	Met and exceeded: 13 external programmes benchmarked across 8 countries (Annex B, Table 15) plus 21 national entries in Tables 9–12; Finnish entries confirmed and extended by LAB, Dutch VET entries confirmed by Curio
Industry validation sessions (WP2 T2.2)	≥ 1 plenary or written track	Met: camp of 2 June 2026; partner review (written reflections of 't Heem and Macomi) and Breda plenary as ecosystem check; written form carried over to the next ecosystem camp for T4.3, confirmed by Vision Factory (Annex C)
Bibliographic references	≥ 80	52, all cited in the text; the internal target of 80 was not reached and no reference was added for count alone; the reference base grows with T4.3 and the T4.5 library
Internal review cycles by partners	1 full cycle on v0.9	Done: LAB (14/09), Vision Factory (16/09 and 23/09), Curio (21/09), 't Heem (21/09) and Macomi (25/09) integrated; Tredu, Avans and IPN raised no corrections; plenary discussion at Breda (22–23/09/2026)
Language quality pass	1 full proofread	Done: final consolidation and language pass, 28–30 September 2026
Dissemination level / type in EU Portal	Public (PU) / Report (R)	Confirmed

Table 16. KPI dashboard for D4.2 (see the internal D4.2 Action Plan, Section 2.7).

Annex E Record of the September 2026 partner review

The review was deliberately narrow: each partner was asked only for the items below, and everything else was UPV's responsibility. The last column records the outcome of each ask at the close of the review (30 September 2026).

Partner	Sections to validate	Specific asks and outcome
LAB (Soile Komssi, Annamaija Id-Korhonen)	2; 4.1	Confirm the D4.1 recap and the Curio country correction; validate FI HEI reading; extend Table 9. Outcome: done (checked copy of 14/09/2026;

		nine comments integrated in v0.99)
Tredu / City of Tampere (Inga Pöntiö)	4.1	Validate FI VET and practice reading; extend Table 9; add anything missing from the Finnish picture. Outcome: no corrections received within the review window; the Finnish reading was confirmed by LAB (14/09/2026) and stands as drafted; open to refinement in T4.3
Avans (Raymond Sparreboom, Angele Geerts)	4.3; 7.1	Validate NL reading; confirm WP3 alignment of Section 7.1; extend Table 11. Outcome: no corrections received within the review window; discussed at Breda; the HBO reading stands as drafted from public documentation; open to refinement in T4.3
Curio (Dorien Duindam)	4.3	Validate NL VET reading and the country correction; extend Table 11. Outcome: confirmed by Dorien Duindam on 21/09/2026 (VET/Curio text of Section 4.3 and Table 11 correct, no additions; the university part not assessed by Curio)
IPN (António Sampaio)	4.4	Confirm or correct the whole Portuguese section; extend Table 12. Outcome: no corrections received within the review window; the desk-based Portuguese section stands as drafted; open to refinement in T4.3
Vision Factory (Laura Väisänen, Krista Keränen)	4.5; 5.3; Annex C	Share camp outputs; confirm the Step A completion route (Section 4.5) and the carry-over of the Annex C form to T4.3; sanity-check Areas 2 and 3 of the map. Outcome: comments of 16/09/2026 integrated in v0.99 (terminology); Step A route and the carry-over of the form to the next ecosystem camp confirmed on 23/09/2026; consolidated camp outputs not available before the freeze
Macomi / 't Heem	5; 6	Optional: working-life plausibility check of gaps and responses. Outcome: written reflections received from 't Heem (21/09/2026) and Macomi (25/09/2026); gaps and responses recognised, by 't Heem from long-term care practice; Macomi's proposal on the selection of high-fidelity prototypes taken into Section 7.1 (Annex C)
Coordinator, LAB (Pirjo Tuusjärvi)	Whole document	Formal check before submission; portal metadata (PU, R, M11). Outcome: done (14/09/2026: disclaimer, Executive Summary order, Table 1 note)

Table 17. Review asks by partner and their outcome. Comments were received through Word margin comments and tracked changes (LAB checked copy) and by email to the WP4 lead.

Annex F Glossary and abbreviations

- **AI (artificial intelligence).** Computer systems that perform tasks normally requiring human intelligence, such as pattern recognition, language understanding or decision support.
- **AI literacy.** Per Article 4 of the AI Act, the skills, knowledge and understanding that allow providers, deployers and affected persons to make informed use of AI systems and to be aware of their opportunities, risks and possible harms.
- **CTeSP.** Curso Técnico Superior Profissional, Portuguese short-cycle higher professional programme at EQF 5.
- **DigComp 2.2 / DigCompEdu.** The EU digital competence frameworks for citizens and for educators, respectively.
- **EACEA.** European Education and Culture Executive Agency, the granting authority of the project.
- **EHDS.** European Health Data Space, Regulation (EU) 2025/327.
- **EntreComp / GreenComp.** The EU reference frameworks for entrepreneurship competence and sustainability competence.
- **EQF.** European Qualifications Framework, eight reference levels expressed as learning outcomes; EQF 4 ≈ upper secondary VET, EQF 5 ≈ higher VET and short-cycle tertiary, EQF 6 ≈ Bachelor, EQF 7 ≈ Master.
- **EQAVET.** European quality assurance reference framework for VET.
- **FP.** Formación Profesional, the Spanish vocational education system; its 2022 reform introduced micro-accreditations.
- **HEI / VET.** Higher education institution / vocational education and training.
- **Lähihoitaja.** Finnish practical nurse, vocational qualification in social and health care (EQF 4).
- **MBO / HBO.** Dutch secondary vocational education / higher professional education.
- **MCI.** Mild cognitive impairment, a stage of cognitive decline between normal ageing and dementia.
- **Micro-credential.** A certified small volume of learning with defined outcomes, workload and assessment, per the Council Recommendation of 16 June 2022.
- **OER.** Open educational resources.
- **PMC.** Project Management Committee of DETECT 2.0.
- **UEF.** University of Eastern Finland.
- **UOC.** Universitat Oberta de Catalunya, the Catalan open online university.
- **UvA.** University of Amsterdam.

- **Verzorgende IG / mbo-verpleegkundige. Dutch MBO care qualifications (individual healthcare carer / vocational nurse).**