EUcare4.0 COURSE CURRICULUM

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Authors	M. Carmen Fernández Panadero (uc3m)	
Collaborators	Julio Villena Román (uc3m) Carlos Alario Hoyos (uc3m) Carlos Delgado Kloos (uc3m)	
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EUcare4.0 Curricula

Contenido

1. Introduction [WHY]

this document is created to serve as a didactic tool to help mental health professionals to be trained in the techniques of industry 4.0. This curriculum It is intended primarily, but not exclusively, to the VET-trainers, teachers and mentors who will in charge of training future professionals.

1.1 Scope and rational

The objective of the curriculum is twofold, on the one hand to enable teachers/trainers/mentors and other relevant stakeholders to acquire knowledge, skills and competencies related to industry 4.0 applied to mental healthcare. On the other hand, the curriculum can be used also as a flexible template that VET-trainers could adapt (following EUcare4.0 training guides) to train the groups they are responsible for.

The design of the curriculum for EUcare4.0 has been carried out using three **fundamental components** as a basis:

- **Main technologies of Industry 4.0** (IoT, Big Data, AI, AR/VR) for the design of the technical competencies.
- **General European skills recommendations** for the design of non-technical /transversal competencies: teamwork, communication and digital. See: [7], [8], [9], [10], [11], [12] for further details.
- PhyMEL framework for the pedagogical design of the main elements of the curriculum: competencies, objectives, learning outcomes, performance indicators, methodology and evaluation. The acronym PhyMEL stands for **Phy**sical, **M**ental and **E**motional Learning. See: [1], [2], [3], [4] for further details.

The main elements of **innovation** of this curriculum are:

- The novelty of the addressed technologies related to Industry 4.0
- The expertise of the partnership both from a technical and educational point of view. The authors of the educational materials belong to different areas (pedagogy, VET, higher education, engineering, automation, ICTs and healthcare) and to different countries. This complementarity allows them to have a global vision about how to integrate these disruptive technologies into VET learning pathways for mental health in Europe.
- The use of PhyMEL framework as the pedagogical rationale behind all curricular decisions.

The expected **impact** of this curriculum is to improve the quality of the EU mental healthcare sector through suitably trained specialist.

1.2 Need Analysis

Digitalization of EU healthcare has the potential to boost people's health and enable more efficient ways of delivering healthcare services. However, this potential cannot be fully taped if the professionals working in the system are not suitable trained and do not have the right skills, knowledge, and attitudes.

In particular, the mental healthcare sector is undergoing a significant transformation generated by the increasingly adoption of Industry 4.0 enabling technologies, the so-called Health 4.0

revolution. This revolution requires new competences related to technologies such as mixed reality (AR/VR), internet of things, artificial intelligence or big data.

All these competences related to Health 4.0 concepts and technologies applied in the mental health sector are not currently covered by the European VET curricula. This situation highlights the urgent need to further strengthen European VET official programs by developing an innovative curriculum and relevant training modules focusing on Health 4.0 and underlying technologies relevant for mental health.

These will allow VET teachers/trainers/mentors to acquire knowledge, skills and attitudes that enable them to train mental health specialists and prepare them for the transformation to Healthcare 4.0. This curriculum can be useful also to other relevant stakeholders (VET/Healthcare learning providers, education institutions or policy makers) to acquire competencies required to successfully implement Health 4.0 in their current or future jobs.

As a consequence of this analysis, the four most important needs detected are:

- raise awareness about Health 4.0, benefits of digitalization
- gain knowledge about digital technologies applications in the specific sector of mental healthcare
- be able to identify which of these technologies can be included in official education paths and
- design strategies to do it.

2. Learning environment [WHERE]

The objective of EUcare4.0 project is to reach the maximum number of professionals possible, but one of the main challenges is that they are professionals from different European countries, with different work contexts and who generally have little time for training. This section describes the selected learning platform and delivery method to address these issues.

2.1 Learning platform

EUcare4.0 project propose the platform eXtension deployed at Universidad Carlos III de Madrid: https://extension.uc3m.es/ as the primary mean for distribution training Materials. Extension is a MOOC platform (Massive Open Online platform based on opened (https://openedx.org/). This platform allows students train active learning at their own through receiving multimedia content, performing interactive activities and to obtaining a certificate at the end of the course if they successfully pass the evaluation tests. On the other hand, it allows teachers to deploy different types of activities using only a web browser, automate the evaluation and sending of feedback and monitor the development of the course.

2.2 Delivery Method

The course is implemented to be taken online and at the learner's pace. However, a recommended learning path is provided as a guide to facilitate the follow up of the course. See Annex 1.2 for further details. VET instructors can follow the course as trainees. But they can also adapt these materials in their role as trainers and use them in courses with other delivery methods: face-to-face, synchronous online, or hybrid courses.

2.3 Material resources

The only resources to take the course as a trainee are:

- A device with internet access
- A multimedia enabled browser.
- Be registered in the extension platform https://extension.uc3m.es/. If you are not registered, please contact your nearest EUcare4.0 project partner.

Course materials have been created under a creative commons non-commercial share alike license, therefore VET instructors in their role as trainers will be able to adapt them to other educational contexts.

3. Scheduling [WHEN]

The programming of the EUcare4.0 curriculum considers not only the physical time in which the activities must take place but also the psychological time, i.e. the different states (physical/mental/emotional) that the learners goes through during their training.

3.1 Physical Time

Physical time is the estimated duration it should take an average student to successfully complete the course. This course has been designed to be completed in self-paced mode, however, an estimated duration is provided for guidance. The time has been structured for an average dedication of one hour per week for 5 days, which is considered a manageable time for people who are working while training.

The content is structured in 10 modules. Each module can be completed in one week at a pace of 5 hours of dedication per week with individual assignments (tasks) of between 5 and 90 minutes maximum. This make a total of 300 hours equivalent to 2 ECTS credits. Each credit represents about 25 hours of learner work.

Each content unit, regardless of its level of granularity (module/topic/activity), includes its own duration. Therefore, is possible to create new learning paths by selecting and reordering content units and automatically calculate its duration.

3.2 Psychological Time

Psychological time, however, represents the different stages of learning that a student goes through during the course. How long the student remains in each stage depends on his or her personal characteristics and dedication. The PhyMEL framework represents the psychological time using twelve steps of the Hero's Journey [3].

4. Target Groups [WHO]

This section describes different profiles targeted by this curriculum. It describes also how to create learning paths for the different profiles and finally include some recommendations to facilitate the adaptation of the curriculum to students with special educational needs in the affective, cognitive and psychomotor domains.

This course contemplates three student profiles. Each of them is described below.

4.1 Senior Managers

They are the tertiary target group and represent the positions who make the final decisions that directly affect mental health workers (teachers or professionals) at their workplace, such as for example policy makers and officials responsible for education. They only need a global overview about Industry 4.0 technology but without going into the technical details. They only need to know main strengths, weaknesses, opportunities and threats (SWOT) to gain strategic vision that will allow them to take better decisions about how to integrate these technologies in the workplace to improve the mental health sector

4.2 Mid-Managers

The secondary target group are people in middle management such as healthcare and trainer providers or education institutions. The middle managers need to know, on the one hand basic global information to communicate with the senior managers (tertiary group) to motivate decision making, and, on the other hand detailed practical examples to communicate with the VET-instructors (primary target group) who will have to teach the technology in detail to future mental healthcare workers.

In order to carry out their work, they need to know, not only strategical information, but also more detailed information on success scenarios (case studies) where a technological intervention has been made using Industry 4.0 tools for mental health. Some example of these scenarios are apps for mental healthcare and telepsychiatry. This knowledge will allow them to argue how the advantages have been exploited and the challenges have been overcome.

4.3 VET-Instructors (trainers/teachers/mentors)

The primary target group for EUcare4.0 curricula are VET instructors such as teachers, trainers or mentors specialized in mental healthcare. These professionals have an essential role to play in the development of the skills related to Health 4.0 in mental health sector, as they apply the decisions made by managers (tertiary target group) and endorsed by mid-managers (secondary target group) to prepare future mental health workers to master the new technologies on a daily basis in their workplace.

For these professionals, strategic knowledge and specific success scenarios (case study) are not enough; they also need to know the technology in depth and be able to create their own concrete scenarios that allow them to test the technology in a more practical way with their students.

The EUcare4.0 curriculum has been designed so that VET-instructors can live as trainees what they will later have to teach as trainers.

As trainees, VET teachers/trainers/mentors need suitable opportunities and resources for initial and continuous professional development. In addition, given their daily heavy workload, as teachers and/or healthcare personnel they need the opportunity to learn at their own pace and time from home.

As trainers they have not time to create a curriculum from the scratch for each innovation impacting mental health sector, so they need innovative VET curriculum and related open access resources such as course content and training guidelines ready to be adapted and curated for their own purposes.

In both cases as trainees and trainers, they need evaluation tools and certification as well as an e-Learning space that provides free and open access to training materials and relevant case-studies about Health 4.0 technologies.

5. Purpose [WHAT-for]

The course objectives, learning outcomes and competencies answer the question of what knowledge, skill or attitude gap this course is designed to address. The main difference among these terms is as follows:

5.1 Learning Outcomes (LO)

A Learning outcome is a concrete statement that reflects a **measurable milestone** (exam, demonstration of expected behavior, or project delivery) that the learner will be able to do in a measurable **time** with concrete evaluation criteria (**cutoff value**) for Key **Performance indicators (KPI)**. This milestone will be the result of participating in one of the educational activities programmed. This measurable Learning outcomes are redacted focusing on what a learner is expected to do at the end of the activity and using the SMART criteria (see : Smart Objectives)

In EUcare4.0, each module has 9 different types of learning outcomes: 3 related to knowledge, 3 with procedures and 3 with attitudes. This Learning outcomes are measured with 3 different types of **evaluation instruments (EI)** of increasing difficulty and their respective performance indicators. See Table 1: Learning Outcomes and KPIs for EUcare4.0 Project for a complete description on the 9 Learning outcomes.

Figure 1: Smart Objectives
Author: Dungdm93. Source: https://commons.wikimedia.org/wiki/File:SMART-goals.png

Table 1: Learning Outcomes and KPIs for EUcare4.0 Project

Learning Outcomes			Performance indicators (PI)			
Expected Results: What to evaluate?			How/Who evaluate?			
The student will be able to perform **on time** and with an acceptable quality standard (**KPI**) the following **tasks**:			**Evaluation instrument** (EI)	**Type**: SA/PA/EA **S**elf/**P**eer **E**xpert Assessment	**Value** (%)	**Time** (min)
				SA/PA/EA		
Knowledge	LO1	Identify, select and classify key **data/facts/events** relevant in the evolution of	E1. Summative test with theorical and practical content	SA	70%	15
	LO2	Identify, select and classify key **stakeholders needs** that justify the introduction of				
	LO3	Identify, select and classify **key concepts** related to				
Procedures	LO1	Differentiate, use and organize simple steps to build **key procedures** related to				
	LO2	**Evaluate a given case study** by applying performance checklists (rubric) to a strategy/scenario that summarize key concepts and process related to	E2. Summative Performance checklist applicable to a given scenario: Case Study	SA/PA	10%	15
	LO3	**Co-design, create and share a new case study** (strategy/scenario) that summarize how to apply key concepts and process related to	E3. Summative deliverable of a new scenario: Case study transferable to your own workplace	SA/PA	20%	90
Attitudes	LO1	**Identify co-workers and collaborate with them** during project design by identifying roles, sharing and discussing ideas and reaching a common solution.				
	LO2	**Manage authorship** , citations to external **references** and creative commons **licenses** of their own creations before sharing online.				
	LO3	By **processing MM content**, filling out interactive **tests**, performance **checklist** and **survey**, creating and sharing **documentation**, and **communicating** online with co-workers/other learners	Not Explicitly graded			

(The column <ModuleTitle> spans the Evaluation instrument group for the technical rows)

5.2 Learning Objectives (O)

A learning objective is a general statement that describes the **expected short-term goal** at the end of an educational activity, didactic unity or complete training course. In EUcare4.0 curriculum each didactic unit (module) has 9 objectives, 6 related to technical competences and 3 related to transversal competences Each one of the six technical objectives is connected with one of the 6 levels of Bloom Taxonomy. See Figure 2: Bloom taxonomy for further detail. The 3 transversals objectives: teamwork, communication and digital competence has been selected from previous European studies about relevant competences for VET ([7], [8], [9], [10], [11], [12]). Learning objectives are redacted focusing on what an instructor, program or institution

aims to do. See Table 2: Learning Objectives for EUcare4.0. Adapted from PhyMEL-Templates for further detail.

Table 2: Learning Objectives for EUcare4.0. Adapted from PhyMEL-Templates

Expertise Level	Learning objectives Course short-term goal			Technical Skills (Bloom Taxonomy)						Non-Technical Skills		
				L1-	L2-	L3 Apply	L4-Analyze	L5-Evaluate	L6-Create	Teamwork	Communicate	DigCompEdu
at Millers' pyramid of competence (4Levels)	The **aim of the course** is that the learners demonstrate expertise by applying technical and non-technical skills. For example, general action-verbs from different domains (cognitive, psychomotor, or affective at different levels of Bloom's Pyramid											
L1-KNOWS-WHAT	**Knowledge**	O1	Demonstrate knowledge (remembering and understanding) about key milestones that **motivates the evolution** of	x	x							
		O2	Demonstrate knowledge (remembering and understanding) about key stakeholders needs that **justify introducing**	x	x							
		O3	Demonstrate **knowledge** (remembering and understanding) about key concepts of	x	x							
L2-KNOW-HOW	**Procedures**	O1	Perform **basic skills** (applying and analyzing) related to key procedures of			x	x					
L·3-SHOWS-HOW		O2	Integrate **critical thinking** (evaluating) a given Case Study about how to introduce in a professional environment					x				
L4-DO		O3	**Autonomously develop an original job-transferable project (Creating) about how to introduce**						x			
DO-Professionally	**Attitudes**	O1	Practice 5C of **teamwork** (identifying **C**ommon purpose, **C**lear expectations per role, **C**ommunicate results, **C**ollaborate to align and learning from **C**onsequences.)							x		
		O2	Practice **communication and sharing** of final products in an ethical way Knowing the basic rules for citing authors, references, and licenses.								x	
		O3	**Practice performing common tasks digitally such as learn, create, communicate or share**									x

(The column spanning O1–O3 for L1/L2/L3/L4 rows is labeled <ModuleTitle>)

Figure 2: Bloom taxonomy
Source: https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/
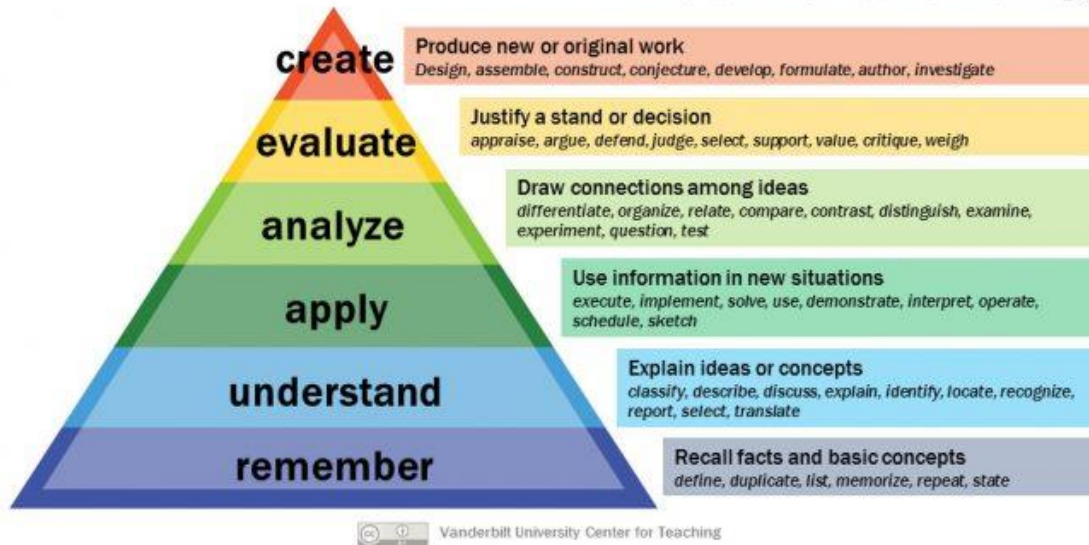
5.3 Learning Competencies (C)

A learning competency is a general statement that describes the **expected long term-goal (at workplace).** Competencies refers to the capability to transfer acquired knowledge, skills and professional attitude beyond the course to successfully perform "**critical work functions**" as a professional worker and citizen.

The list of competencies coincides with the learning outcomes and course objectives: 9 competences (6 technical and 3 non-technical). The transversal competencies: teamwork, communication and digital have been selected from several work in progress in Europe to identify relevant European skills, competences, qualifications and occupation for citizens in general ([7], [8], [9]), and for VET in particular ([11], [12], [13]). The digital competence will use DigCompEdu [13] as the reference framework.

The complete list of competencies is described in Table 3: Learning Competencies for EUcare4.0 Project. Adapted from PhyMEL-Templates and its structure is based on [3]-

Learning competences are redacted focusing on what labor market and society expects from learners to be **successful professionals at labor marketplace**.
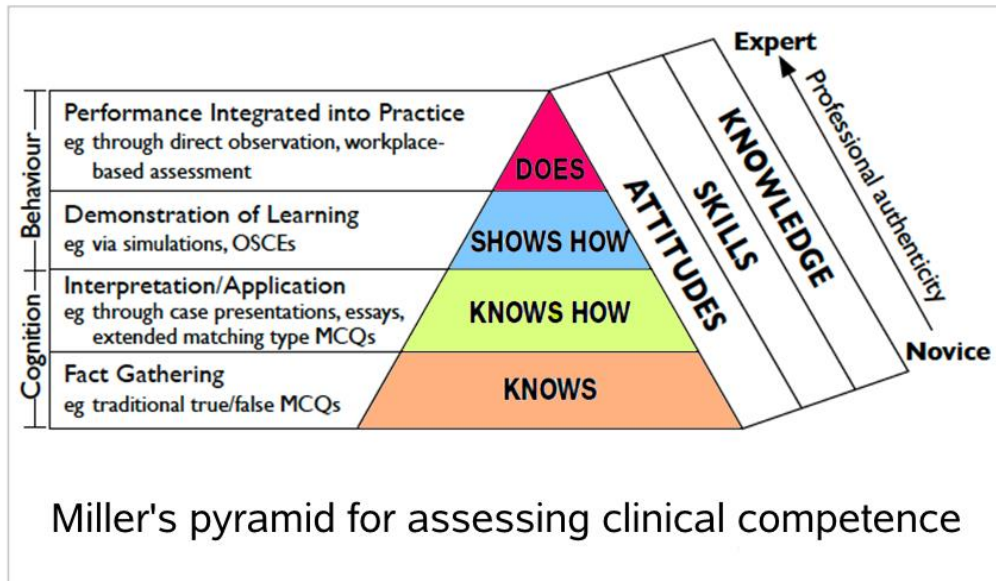
Figure 3: Miller's pyramid of professional competence
Source: https://lo.unisa.edu.au/mod/book/view.php?id=611025&chapterid=105881

5.4 Designing with purpose for meaningful learning.

To ensure that learning is truly meaningful, and that the lessons learned are transferable to the workplace, it is necessary to start the design with a **top down approach**. The first thing to do is to define the **competencies** (C), i.e. what concrete changes we would expect to find in the job-related tasks (expected behavior) if the training were successful. Once the competencies have been identified, the next step is to define the course goals (objectives), i.e. what generic tasks the students should be able to perform in order to make this possible. A detailed list of these generic tasks can be seen as headings for each of the levels of Bloom's taxonomy (see [4] and Figure 2: Bloom taxonomy). Finally, it is necessary to define what concrete tasks that we are going to use to evaluate each objective. These concrete task (evaluation instruments) should result in measurable milestones (Learning Outcomes) that can be assessed through performance indicators (KPIs) to ensure that learning has been effective.

The formulation of objectives, learning outcomes and competencies for EUcare4.0 curricula follows the PhyMEL framework, and this allows to consider simultaneously different theories such as:

- SMART criteria (see Figure 1: Smart Objectives) for the definition of Learning Outcomes
- Bloom's taxonomy (see Figure 2: Bloom taxonomy) for the definition of Learning Objectives
- Miller's pyramid (see Figure 3: Miller's pyramid of professional competence) for the definition of Learning Competencies

Table 3: Learning Competencies for EUcare4.0 Project. Adapted from PhyMEL-Templates

Expertise Level	Learning objectives			Technical Skills									Non-Technical Skills		
	Course short-term goal														
at Millers' pyramid of competence (4 levels)	At the end of the course the learner will be able to demonstrate expertise at their workplace by professionally being able to:			Industry 4.0	Health 4.0	Mental Healthcare	m-Health and e-health	Telepsychiatry	IoT	Big Data	Artificial intelligence	Mixed reality (AR/VR)	Teamwork	Communication	Digital (DigCompEdu)
L1-KNOWS-WHAT	Knowledge	C1	Argue using SWOT (Strengths, Weaknesses, Opportunities and Threats) why is important/urgent to introduce	x	x	x	x	x	x	x	x	x			
		C2	Recognize main **triggers that shows the opportunity for the stakeholders** to integrate	x	x	x	x	x	x	x	x	x			
		C3	Gain working knowledge about key concepts to make **better informed decisions** about	x	x	x	x	x	x	x	x	x			
L2-KNOW-HOW	Procedures	C1	Gain working knowledge about key procedures (identify and organize individual steps) to be able to supervise them **reinforcing best practices and avoiding common errors** applying	x	x	x	x	x	x	x	x	x			
L·3-SHOWS-HOW		C2	Identify main **elements to look for in a proposed external solution** to evaluate which of the available options is most suitable for introducing	x	x	x	x	x	x	x	x	x			
L4-DO		C3	Be able to **autonomously outline a case study** (strategy/scenario) for introducing	x	x	x	x	x	x	x	x	x			
DO-Professionally	Attitudes	C1	Identify relevant stakeholders and their role (allies and enemies) for introducing										x		
		C2	Be able to **communicate and share final products** (strategies/scenarios) **in an effective way** to maximize the likelihood of introducing											x	
		C3	Gain experience **performing job-relevant tasks in a digital environment to be more efficient** doing tasks such as learn (facts, concepts, skills), critical thinking and content creation required for introducing												x

(Note: The column spanning "<Module Title>" appears vertically between the learning objectives and the technical skills columns for the L1 through L4 rows.)

6. Content [WHAT]

The content of EUcare4.0 curricula have been selected to provide a general overview of principal Health 4.0 concepts, processes, technologies, and cases of use applied to mental health sector.

6.1 Distribution of contents in blocks and modules

The course is organized in three content blocks oriented to three groups of professionals (see section: Target Groups [WHO]) who need to know the technology at different levels of abstraction:

Block 1 contains three modules and follow a top-down approach to give an overview about Industry 4.0, how it has been applied in the healthcare field, and in particular in mental health. It is suitable for people who need an overall knowledge, without technical details to develop an overall strategy of how to introduce Industry 4.0 techniques in the mental health sector such as policy makers.

Block 2 (modules 4, 5 and 6) shows examples of how some of these technologies are already being used and what their impact for people as individuals, for the environment (home/work) and for the community (society). This block is geared for people, such as mid managers (education/healthcare providers) who in addition to the strategic vision need more practical knowledge to know how others have already faced the challenges and opportunities of introducing Industry 4.0 in the mental health sector.

B**lock 3** (modules 7-10) gives an overview of some of the most important enabling technologies to be aware of for the successful implementation of Industry 4.0 for mental health in the near future This block goes into much more detail on technical aspects and is aimed at professionals who need to know the details of the concepts and procedures behind each technology in order to be able to teach them to future professionals (VET trainers/teachers and Mentors).

Table 4: EUcare4.0 Learning Content (Blocks)

Module	Description	Duration (hours)
Course content 2 ECTS (50h)		
PATH-1	**STRATEGY. Strengths, Weaknesses, Opportunities and Threats**	**15**
M1	Introduction to Industry 4.0	5
M2	Introduction to Health 4.0	5
M3	Application of Health 4.0 to mental health sector	5
PATH-2	**SUCCESSFUL STORIES. How impact on People, Environments (Home/work) and Society**	**15**
M4	Introduction to mHealth and eHealth	5
M5	Mental health apps	5
M6	Telepsychiatry	5
PATH-3	**ENABLING TECHNOLOGIES. Why are they important and how to develop a strategy to introduce them at the workplace**	**20**
M7	**IoT** for mental healthcare. Devices, Infrastructures, Communication and User Experience	5
M8	**Big data** for mental healthcare. Data Types, Reading/cleaning, Describing/exploring, Modeling/transforming	5
M9	**Artificial Intelligence** for mental healthcare. Inference Models, Clustering/Classification, Pattern recognition, Prediction	5
M10	**Mixed reality (AR/VR)** for mental healthcare. Milgrams's continuum AR, VR, Multimodal interfaces	5
	Total :	**50**

The content has been designed in a **modular and flexible way**. Each module is self-contained and therefore, can be used separately or combined with others to create different learning paths. See 8.4 Personalization section for further details.

Modules has been designed to be deployed through EUcare4.0 Learning platform (https://extension.uc3m.es/), but can also be downloaded and used as support material in a face-to-face environment.

For a global view of the whole course with the description of each module and sections and their respective connection with, objectives and target audience see Annex 1.1.

6.2 Distribution of Modules sin Sections

For a detailed vision of each of the modules individually, with their activities, learning outcomes, key performance indicators and potential adaptations see Annex 1.2.

6.3 Content formats

All modules have information in a **wide variety of formats** such as lectures, graphics, videos, interactive activities, and surveys.

A typical module would have the contents distributed as follows:

- 120 min Lectures (110 min video + 10 min reading)
- 170 min of Assessment (55 formative + 115 summative)
- 10 min Surveys (5 min initial + 5 min final)

For more details about how these content formats are integrated in the module see: **Error! R eference source not found.**.

7. Evaluation and certification processes [HOW-much]

The evaluation consists of gathering information about the teaching and learning process in order to analyze how it is developing and to introduce improvements if necessary. It consists of three parts. In the first place, the evaluation of the degree of achievement by the students of the course objectives. In the second place the certification of the acquired competences and finally the evaluation of the learning process itself.

7.1 Learners' evaluation

The ultimate goal of the assessment is to demonstrate that the learner has acquired the key competencies to successfully perform his or her job. See:
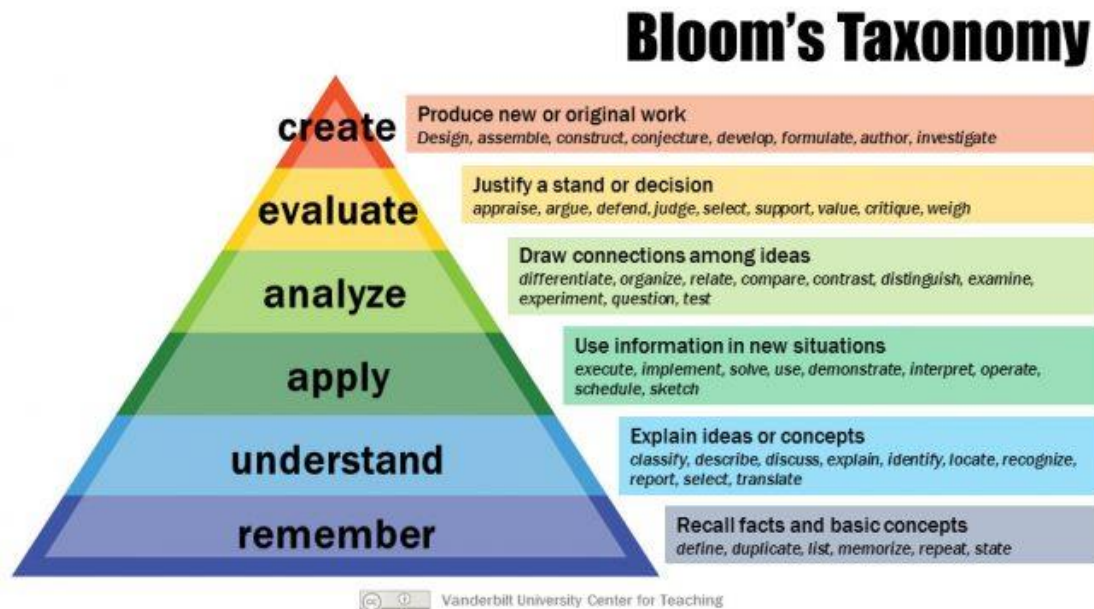

Figure 2: Bloom taxonomy

Source: https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/

5.3 Learning Competencies (C) for further details. This includes behaviors related to their knowledge, skills and attitudes. But we cannot measure competencies therefore, each competency is related to one or more course objectives. See:

5.2 Learning Objectives (O) for further details. Each objective describes general behaviors (verbs throughout the Bloom's pyramid) applicable in the cognitive, psychomotor and affective domains. This information, at the course level, is still too generic to be assessed in an objective way and therefore each course objective is further divided into simpler tasks, with measurable milestones or learning outcomes. See: 5.1 Learning Outcomes (LO) for further details. These Learning Outcomes can be measured objectively since each of them has a time of completion and a minimum performance level assigned.

The generic formula to apply would be the one described in Figure 4: PhyMEL formula to relate Course Objectives, Learning Outcomes and Competences.

> <TargetGroup> will **be able to demonstrate** <CourseObjective> **by performing** a **summative task** <EvaluationInstrument> with this **expectable result** <LearningOutput>
> **on time** and with an acceptable **quality standard** <KPI> **to professionally** be able to demonstrate <Competence>

Figure 4: PhyMEL formula to relate Course Objectives, Learning Outcomes and Competences

The application of this formula and relationships among student learning outcomes, course objectives and professional competences, for each of the modules can be found in Annex 1.2

7.2 What to evaluate

The evaluation should allow us to gather information on concepts, skills and attitudes. It is also necessary to evaluate both technical skills (related to the topic) and non-technical skill such as communication, teamwork and digital competence.

All modules have the same evaluation methodology as described in Table 5: EUcare4.0 Evaluation Summary:

- Technical skills
  - The knowledge about **data/facts** motivating each module and **target group needs**, together with the basic **key concepts and skills** (L1,L2, L3, L4) of Bloom's taxonomy), are assessed by multiple-choice test.
  - The **given case studies** that prepare for critical thinking (L5 in Bloom's taxonomy) are assessed by performance checklist.
  - The **project deliverable** (self-created case studies. L6 in Bloom's taxonomy) is assessed by a performance checklist.
- Non-technical skills (communication, teamwork and digital skills) are not evaluated through direct observation by the expert, but through specific questions in the project rubric (performance checklist) that can be done autonomously or through peer evaluation. This is so because the course is self-paced and therefore the student should be able to pass all the test without the external supervision of a teacher.

7.3 How to evaluate

The objectives related to the first 5 levels of the bloom pyramid are assessed through formative and summative evaluation while the last one, project delivery and transversal skills are only assessed in a summative way.

The **formative assessment** has several objectives. First of all, it allows the student to be aware of his or her own evolution. Secondly, thanks to the feedback it allows to reinforce the knowledge and skills achieved and to correct those not achieved. Finally, it also serves as a trial run to get a general idea about the final exams that they will be to pass in order to obtain the certification. Project and transversal skills have no formative assessment associated because, work with the case studies already serves as training for the project to be developed since they have the same format. On the other hand, the transversal skills, although they are trained throughout the course, no measurable tasks related to them are requested until the delivery of the project.

Summative assessment is mandatory only for those who wish to get a certificate at the end of the course. There are 3 summative activities:

- **E1 Test** for Blooms' taxonomy levels L1/L2 (remember/understand) and L3/L4 (apply/analyze). This test consists of a multiple-choice questionnaire about data/facts, target group needs, and key concepts and procedures.
- **E2 Case** Study for level L5, and E3. Consists of a performance checklist to critically evaluate (using rubrics) the case study
- **Project Delivery** for L6. It consists of delivering a self-created project (following the model of the case studies) and a self-evaluation where, in addition to questions related

to the content of the project, there are others related to the transversal skills needed to develop it.

The final grade for the course will be the weighted result of the 3 graded activities (70% E1, 10% E2 and 20% E3). Table 5: EUcare4.0 Evaluation Summary shows, exams description, evaluation criteria and weigh of each exam on the final grade.

7.4 When to evaluate

Table 5: EUcare4.0 Evaluation Summary, shows the timing of the exams described in previous sections, there is also a test at the beginning of the module (initial survey) and another one at the end of the module (final survey) the first one to assess previous and the last one to check satisfaction with the course.

MODULE-X										
WHAT / WHEN to evaluate					**HOW to evaluate**					
All activities are evaluable					**FA**: Formative Assessment and **S**urveys:					
Only final activities are certifiable					(Test + Performance checklist)					
Examples of content: Lectures to **L**isten (video/podcast) or to **R**ead (Graphic, lecture).					**SA**: Summative Assessment					
					(Test + Performance checklist + Project Deliverable)					

Content Description		Learning Dynamics						Certification		
		Lecture			Activities		Surveys			
Sx	**SubSection**	Dur (min)	L	R	FA	SA	S	EI	KPI	%
S1	Why <ModuleTitle> is so important? Motivation and leveling	20	x	x			Initial (Si)			
S2	<Topic-1 Title>. Learn and practice (concepts + basic skills)	30	x		x					
S3	<Topic-2 Title>. Learn and practice (concepts + basic skills)	30	x		x			Non certifiable		
S4	<Topic-3 Title>. Learn and practice (concepts + basic skills)	30	x		x					
S5	<Topic-4 Title>. Learn and practice (concepts + basic skills)	30	x		x					
S6	Case Study. Connecting all lesson learned in a complex strategy/scenario	20	x	x	x					
S7	Recap, conclusions, and assessments solutions	15	x							
R	References									
E	**Exams**:	120						Ei	KPI	%
E1	**Test**. Theory (remember/understand key concepts) and practice (apply/ analyze key procedures)	15				x		E1	6/10	70%
E2	**Performance checklist** of a given case study. (Critical evaluation using rubrics)	15				x		E2	6/10	10%
E3	**Project Deliverable**: New case study applicable to their own workplace. Codesign, create, justify, and share.	90					x	E3	6/10	20%
Q	Continuous improvement satisfaction survey (Learner/Teacher/Others)	5					Final (Sf)	Non certifiable		
		300	110	10	55	115	10			
	Total		120		170		10			

7.5 Certification

The learner needs to obtain a minimum grade of 60% in summative assessment per module to be able to pass the course and therefore to get a certificate. All modules have the same weight in the final evaluation and their weighting will depend on the number of modules that make up the learning pathway.

Students will be able to view their own progress and access their certificate (if thy successfully complete the course) through the course platform (see section: 2. Learning environment [WHERE]).

According to European General Data Protection Regulation, only teachers who have permissions as instructors in EUcare4.0 platform will be able to follow the overall progress of their students.
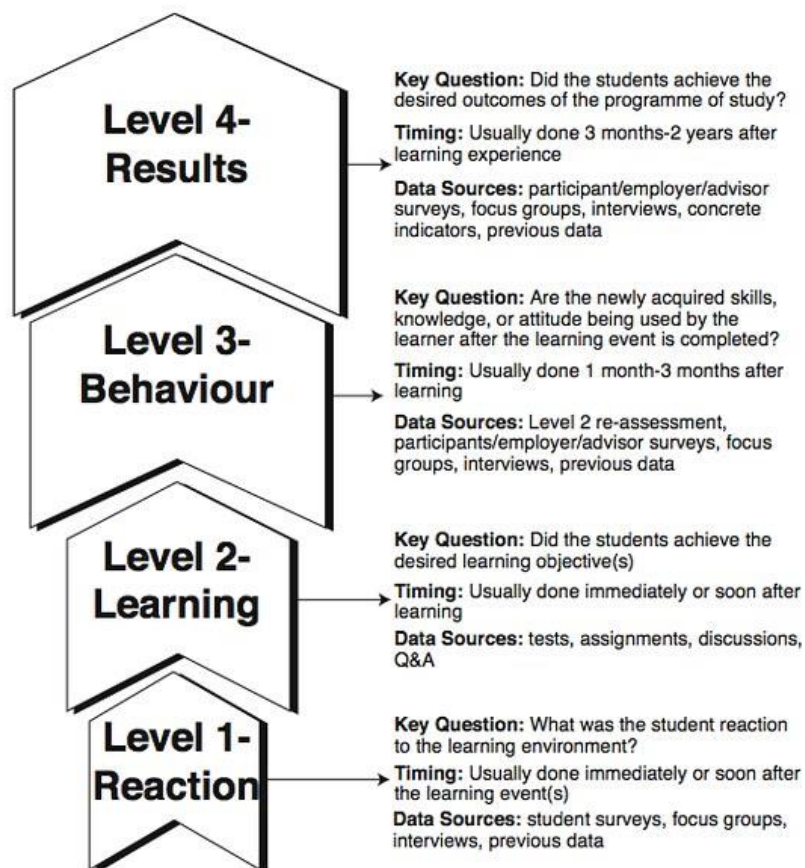
Figure 5: Kirkpatrick's four level pyramid of Evaluation
Retrieved from: https://www.flickr.com/photos/lauradahl/2997492524

7.6 Curriculum Evaluation [HOW-well]

To ensure the quality of the EUcare4.0 curriculum and its continuous improvement, it is necessary to evaluate not only learners' learning (see 7. Evaluation and certification processes [HOW-much]), but also teaching practice.

To do so, EUcare4.0 uses 3 evaluation instruments:

- **Survey for partners** in charge of creating the training materials
- **Survey for trainers** who use the EUcare4.0 training materials to teach their own classes
- **Survey for trainees** who are trained using the EUcare Curriculum.

All questionnaires will be created through AdminProject Portal: https://www.adminproject.eu/ and linked from the online course in Extension: https://extension.uc3m.es/

Teaching practice can be evaluated at 4 levels attending Kirkpatrick's model of evaluation. See Figure 5: Kirkpatrick's four level pyramid of Evaluation for further details. The first level reflects the degree of student **satisfaction** during the course and is measured through the satisfaction questionnaires. The second one reflects **learning**, i.e. student progress during the course and is measured through summative assessment. The third level measures **behavior**, i.e. the transfer of knowledge to daily practice and checks. whether the student is able to transfer what he/she has learned to the workplace. Finally, Kirkpatrick's fourth level **results** shows whether this transfer of knowledge to the workplace has had a real impact on society.

Kirkpatrick levels 3 and 4 are hard to measure in general as they require long-term student follow-up after completion of the course. These levels are beyond the scope of EUcare4.0 project. However, the definition of competencies given in the section
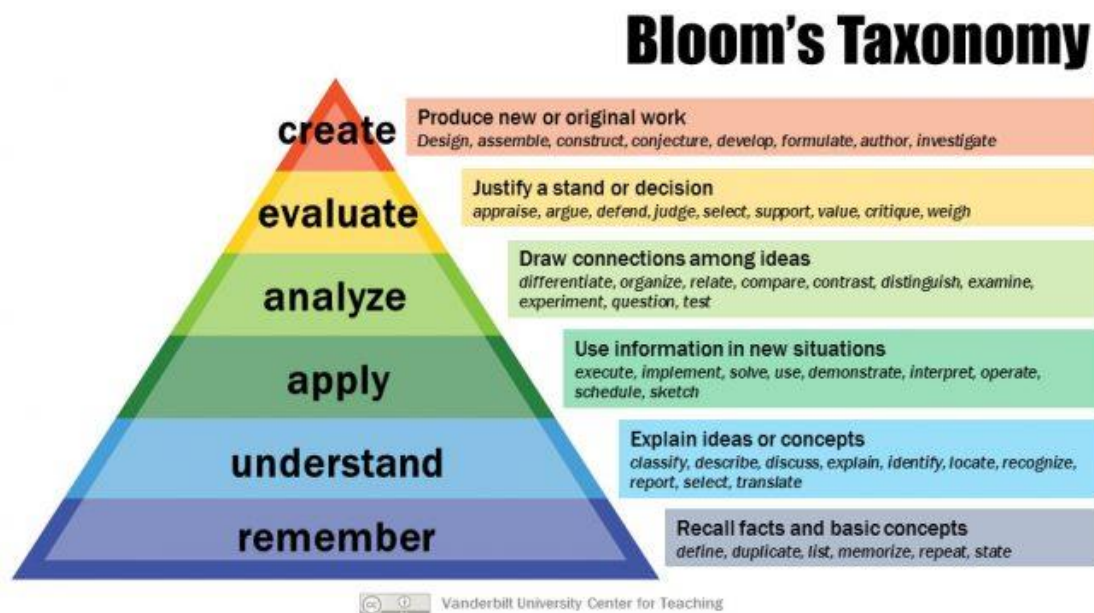

Figure 2: Bloom taxonomy

Source: https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/

5.3 Learning Competencies (C), explicitly describes the observable on-the-job behaviors and the goal to be achieved with them. Thus, teachers who have the possibility to monitor students in the long term could measure Kirkpatrick levels 3 and 4 using these indicators.

8. Methodology [HOW-do]

The didactic methodology is understood as the set of strategies, procedures and actions organized and planned to facilitate learning and the achievement of the proposed objectives.

8.1 Pedagogical objectives

The strategy followed to define EUcare4.0 methodology is based on the PhyMEL framework with two main objectives:

- To achieve that learning be transformative and meaningful in the long term
- To ensure that the adapted methodological decisions are supported by consolidated theories in the fields of psychology and pedagogy.

To achieve the **first objective, be meaningful in the long term**. PhyMEL framework follows a top down approach as described in section 5.4 Designing with purpose for meaningful learning. It starts by defining (1) the long-term goals (competencies) to which we want to contribute in order to achieve successful professionals in the labor market and then moves on to (2) the short-term goals (objectives) to identify the gaps in knowledge, skills and attitudes we want to achieve in the course. Subsequently, we identify (3) the observable behaviors (learning outcomes) that will allow us to objectively measure the knowledge, skills and attitudes and (4) The evaluation criteria that will allow to detect, correct and certify the (5) different levels (rubrics) through which the student passes through the training action to move from the initial level to the desired final level. Knowing these observable behaviors, we can decide (6) different types of learning dynamics/activities that are the more suitable ones to prepare target learners according to their profile and the context in which we are going to apply the curriculum. Finally, we have to decide (7) the schedule, how many times the learner should participate in each activity to demonstrate successful performance and finally we create or select (8) the resources (material and logistic) to deploy and evaluate the learning action.

To achieve the **second objective, a solid foundation based on scientific advances** in pedagogy and psychology, the PhyMel framework uses the 12 steps of the hero's journey by Campbell ([14], [15]) as an anchor point to integrate and harmonize different theories behind the psychology, pedagogy and enjoyment (gamification) of learning. See bellow some examples of the theories in which PhyMEL is based.

- **Psychology**
  - Monomyth by Joseph Campbell [14], and the Writer's journey by Vogler [15] to explore the transforming potential of the storytelling through the 12 steps of the hero's journey.
  - Flow state by Csikszentmihalyi [16] to explore the potential effectiveness of the motivation and flow state for learning.
  - Gardner's intelligences [17], and Neurolinguistic programming (NLP) [18] to explore the advantages of adapting materials according of perception channels. Both NLP, and Gardner's intelligences are theories that arouse much controversy. Here we do not refer to Gardner's intelligences as separate

intelligences univocally associated with an individual, but as different strategies that the same individual has for receiving and processing information through different channels: visual, verbal, logical, kinesthetic, musical, naturalistic, intrapersonal, interpersonal, existential

- **Pedagogy**
  - o 4 Stages of learning by Burch [6]: Unconscious incompetence, conscious incompetence, conscious competence, unconscious competence to aggregate the 12 steps of the hero's journey into easier-to-remember stages.
  - o 4 levels of professional competences by Miller (see: Figure 3: Miller's pyramid of professional competence): Knows-what, knows-how, shows-how, do. To identify what the student should be able to do at each phase of the journey.
  - o 4 levels of evaluation by Kirkpatrick (see: Figure 5: Kirkpatrick's four level pyramid of Evaluation): Reactions (satisfaction) , Learning (gain knowledges and skills), Behavior (transfer skills to their daily life), Results (impact on workplace/society). To be aware of the relevance of the later stages of the hero's journey that are beyond the course and show the real impact of the learning done by a student on society as a whole.
  - o 6 Types of Learning activities by Bloom [5]: remembering, understanding, applying, analyzing, evaluating, and creating. Bloom's taxonomy provides a greater level of detail than the Miller levels to describe student performance. Miller levels are described as competencies (from the point of view of the skills required at the workplace) while Bloom's levels are described as objectives (from the point of view of the goals pursued by the course).
- **Enjoyment (Gamification)**
  - o Gamification elements and strategies by McGonigal [20] . She describes why, when, and how to use them. There are many other authors who describe the elements of gamification, but McGonigal has been chosen because, like Kirkpatrick and Campbell, she emphasizes the game as an element that transforms the individual and society, placing the focus not on the course but on what is to be achieved in the long term with it.
  - o Role playing with different characters of the Hero's journey related to the archetypes of Carl Jung according to Vogler description [15]. Reinterpretation by Vogler of Jung's archetypes in the context of the Hero's journey is relevant because it gives a clue as to what to expect from the learner at each stage of learning. The role he plays himself and with which roles he interprets the people who come in contact with him.

8.2 Pedagogical principles

Some of the general pedagogical principles used in the design of the methodology are:

- **Start from the student's developmental level**. To this end, at the beginning of each didactic unit, each student carries out an initial survey of previous knowledge.
- **Promote the construction of meaningful learning**. For this purpose, the module is divided into stages both in physical time (given by the structure of the module) and in psychological time (given by the structure of the hero's journey). To do this, a formative test is included at the end of each stage, which allows the student to become aware of

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his own learning and to use the feedback to reinforce the desired learning and correct the detected problems.

- **Develop work habits**. Although the course is self-paced and therefore the student is responsible for his own learning, a sequencing and timing of the activities is proposed to facilitate this work. This programming is based on short tasks of between 5-90 minutes of duration that facilitates the integration of this task in the personal schedule of the student at an approximate pace of 1h per day during 5 working days.
- **Development of cooperative habits**. Although communication during the course is not supervised, there is a forum associated with each activity. This forum per task allows students to communicate and cooperate with other students who are working with them on the same activity thus avoiding the problems of having to search for a specific task in a general forum. In addition, the subsequent analysis of the content of these forums can help the pedagogical designers to continue improving activities in future editions of the course. These activities help to achieve the transversal objectives 1 and 2 (teamwork and communication)
- **Promoting the use of Information and Communication Technologies**: With the use of the learning platform, students will have to interact with multimedia content, self-correcting activities, communication forums and document creation. These activities help to achieve the transversal objective-3 related to digital competence.
- **Enjoyful learning**. Gamification is beyond the scope of the EUcare4.0 project. However, to make learning more playful, a variety of different tasks have been introduced, from the viewing of videos, through the completion of self-correcting activities, to the analysis of a case study and the delivery of a practical project. In this way the student can move from one type of activity to another depending on the time available, energy level and focus.

8.3 Course dynamics

All modules in EUcare4.0 curricula follow the same internal structure based on the PhyMEL framework [3]. This framework guarantees pedagogical effectiveness by integrating different kind of activities at each stage of the course depending on the psychological time of the student in this moment.

Each module of EUcare4.0 curricula is organized according to this strategy. See Table 6: EUcare4.0 Module structure. Adapted from PhyMEL-Templates) for further details. In this way, the programmed activities help the student move through the six levels of Bloom's pyramid of objectives from the most basic ones such as memorizing or remembering certain relevant concepts through how to use them in context, critically analyzing through case studies how other professionals use these technologies in practice or doing an exercise of putting it into practice by creating their own application use cases from the examples provided.

This route through Bloom's pyramid also corresponds to the route followed by the Hero according to Campbell's model (See [14], [15]) to complete his journey. The course does not follow the student in the long term (in their professional performance) and therefore their journey ends in this case at the stage of the great ordeal (exam, step-8) and the corresponding reward (certificate, step-9). The last stages of the journey correspond to the transfer of the learning achieved to the work environment (steps 10 and 11 corresponding to Kirkpatrick's level 3-Results) and step 12 refers to the transformation of the environment in which he lives

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(work/social) thanks to his learning (Kirkpatrick's level 4-impact). For further details see: Figure 5: Kirkpatrick's four level pyramid of Evaluation.

EUcare4.0

Table 6: EUcare4.0 Module structure. Adapted from PhyMEL-Templates

Hero's Journey	ID	Content Description: Content delivery (**CD**), Non-graded Activity (**FA**: Formative assessment), (**SA**: Summative assessment or graded activity), Survey (**S**)	Activity Type:					
			Bloom	CD	FA	SA	S	Dur (mins)
1	**1.**	**Introduction. Why <Module Title> is so important? Motivation and leveling**	**L1/2**					**20**
	S0	Initial level test					x	5
2	1.1	Surprising facts and data about <Module Title>	L1/2	x				5
3	1.2	Identifying needs and requirements before starting in <Module Title>	L1/2	x				10
4	1.3	Leveling content about <Module Title>	L1/2	x				
5	1.4	Learning contract						
6	**2**	**<Section-1 Title>. Learn and practice**	**L1/2, L3/4**					**30**
6	2.1	What do you need to know to about <Section Title>? Key concepts and misconceptions	L1/2	x				10
	2.2	Formative Test. Remembering and understanding key concepts	L1/2		x			5
	2.3	Relevant skills to apply in <Section Title>. Key procedures and errors to avoid	L3/4	x				10
	2.4	Formative Test. Applying and Analyzing key procedures	L3/4		x			5
6	**3**	**<Section-2 Title>. Learn and practice**	**L1/2, L3/4**					**30**
6	**4**	**<Section-3 Title>. Learn and practice**						**30**
6	**5**	**<Section-4 Title>. Learn and practice**						**30**
6	**6**	**Case Study. Connecting all lesson learned in a complex strategy/scenario**	**L5**					**20**
6	6.1	Description of the given case study. Problem statement.	L5	x				5
	6.2	What to look for in a <Module title> strategy/scenario. Evaluating a given case study. (Demo)	L5	x				5
	6.3	Formative performance checklist of a given case study. Self/Peer critical evaluation using rubrics	L5		x			5
	6.4	How to design a <Module title> strategy/scenario. Evaluating a given Case study (Demo)	L5	x				5
7	**7**	**Recap, conclusions and assessments solutions**						**15**
7	7.1	Recap and conclusions		x				5
	7.2	Assessment solutions and feedback		x				10
		References						
8	**E**	**Exam**	**L1-L6**					**120**
8	E0	Summative evaluation grading and certification. Instructions and Demo.	L1/2					5
	E1	Summative test. theory (remember/understand key concepts) and practice (Apply /Analyze) key procedures	L1/2, L3/4			x		10
	E2	Summative performance checklist of a given strategy/scenario. Self/Peer critical evaluation using rubrics	L5			x		15
	E3	Summative deliverable of a new strategy/scenario applicable to your own workplace. Codesign, create, justify and share	L6			x		90
9	**C**	**Learning Certificate**						
	S	**Continuous improvement. Satisfaction Surveys.**						**5**
	S1	Leaners' experience survey.				x		
	S2	Teachers' experience survey.				x		
	S3	Other roles' experience survey.				x		
		Total :						**300**

8.4 Personalization

The EUcare4.0 curriculum has been designed in a modular and flexible way. The training materials have been designed as small blocks of content like Lego® pieces that can be recombined together to build different learning paths for different profiles.

The methodology has also followed this modular and flexible approach based on the PhyMEL framework so that the recombination of the pieces also make sense from a pedagogical point of view.

Finally, we have also taken advantage of the international character of the EUcare4.0 consortium (see Table 10: EUcare4.0 Partner list) to be able to present the material in different languages for internationalization (see:

Each of these approaches is shown in more detail below.

Learning paths by target group

Three tables below show an example of the learning paths for the three target profiles identified in EUcare4.0 project. But the content is flexible enough to be adapted to other learning profiles or special educational needs.

All learning paths are scheduled at a pace of 1 week per module, 5 hours per week and tasks between 5-90 minutes in duration which is the maximum time it is estimated that a person can maintain continuous attention (flow state according Csikszentmihalyi [16]). All learning paths has also an initial warm-up week that describe the EUcare4.0 curriculum.

The main differences among learning paths for three profiles described at section: 4. Target Groups [WHO], is the number of modules that includes.

- **Primary target group (VET Teachers/trainers/mentors)** will follow up the course as a whole (10-modules, 50h) such is described in Table 4: EUcare4.0 Learning Content (Blocks).
- **Secondary target group (Mid managers)** only need to complete the first two blocks related with strategical information and successful stories without going into technical details described in block 3. This is so because their role is to take informed decision and being able to argue the introduction of technology based on how other has overcome challenges and exploited benefits
- **Tertiary target group (Senior manager)** will only need strategical information (Block-1) to take informed decisions.

Table 7: Learning paths for EUcare4.0 secondary target group: Mid-Managers

Course content 2 ECTS (50h)		
Module	Description	Duration (hours)
PATH-1	STRATEGY. Strengths, Weaknesses, Opportunities and Threats	15
M1	Introduction to Industry 4.0	5
M2	Introduction to Health 4.0	5
M3	Application of Health 4.0 to mental health sector	5
PATH-2	SUCESSFUL STORIES. How impact on People, Environments (Home/work) and Society	15
M4	Introduction to mHealth and eHealth	5
M5	Mental health apps	5
M6	Telepsychiatry	5
	Total :	30

Table 8: Learning paths for EUcare4.0 tertiary target group: Senior-Managers

Course content 2 ECTS (50h)		
Module	Description	Duration (hours)
PATH-1	STRATEGY. Strengths, Weaknesses, Opportunities and Threats	15
M1	Introduction to Industry 4.0	5
M2	Introduction to Health 4.0	5
M3	Application of Health 4.0 to mental health sector	5
	Total :	15

Special needs. Adaptation to diversity using PhyMEL framework

EUcare curricula use PhyMEL framework to provide recommendations for content adaptation to different domains:

- Physical Domain **(Phy**MEL**)**
- **Mental** Domain **(Phy**M**EL)**
- Socio **Emotional** Domain **(PhyM**EL**)**

This section describes 3 example cases of possible adaptations using the PhyMEL methodology but others can be found in [1], [2], [3], [4]:

- **Ej-1: Adaptation of formats according to Gardner's intelligences**. It is recommended to maximize the variety of channels through which information is perceived to facilitate subsequent processing and retrieval by the learner. For example, content that has been transmitted through text, audio and video will be easier for a learner to remember than content that has only been presented in text format. It is not necessary adapt all content to all possible formats, but it could be useful for "key take home messages" to be delivered in as many formats as possible.

- **Ej-2: Adaptation of feedback and error management to the Burch's state of learning**. When learners make mistakes, it is important be aware of their stage of learning because they have different needs at different stages of learning. A student in the early stages of the course (unconscious incompetence) needs motivation to learn and therefore the feedback will not focus on the fact that he/she has make a mistake but,

on the fact, that the course will provide tools in the near future to avoid it and, in this way, he/she will not make this mistake again at job. However, if that mistake is made by an advanced student in the conscious competence stage, the feedback should include the seriousness of the error and the consequences it would have for his professional performance because at this stage the most important thing is that he is prepared to minimize errors in his job.

- **Ej-3: Adapting task scheduling to the learners' chronotypes to facilitate flow state** as described by Csikszentmihalyi. Each person has certain times of the day when they are more productive than others depending on their chronotype and therefore no generic recommendations can be made about what task to do at what time. However, it is known that tasks that require greater concentration, i.e., more participation of the lobe frontal of the brain should be done in their most productive hours of the they. But, more creative tasks are best done in less productive hours, when we are more tired because the frontal lobe of the brain have less activity.

Internationalization

EUcare curricula also provide internationalization and it is available in 5 languages.

Table 9: Abbreviations for the 5 languages used in the EUcare4.0 project

Title of Module	Language
en	English
es	Spanish
fr	French
ro	Romanian
et	Estonian

9. Communication

The course is designed to be taken autonomously and the tasks to be performed are mainly done individually. However, some communication channels have been enabled so that you can be in contact with the course designers and other colleagues who are taking the course at the same time.

With the instructors

This course is self-paced so there will be no direct communication with the instructors. However, there are several communication channels through which we will be able to talk.

- An initial survey to let us know your needs and expectations about the course so we can adapt
- A final survey where you can give us your feedback at the end of the course to continue improving.
- Project EUcare4.0 channels. You can also contact us through the communication channels of the EUcare project: twitter, Facebook, etc.

With peers
- A **forum at the beginning** so you can introduce yourself and meet other classmates and know their motivations.
- A **forum associated to each activity**, so you can communicate with other people who are at the same point in the course as you.
- **Teamwork with your coworkers**. The final activity of the course. Creation of your own original case study requires you to communicate directly with your co-workers, through the same channels you use in your daily activity (face-to-face/online, synchronous/asynchronous) to collaborate in the process of co-designing a case study that can then be transferred to your workplace own workplace

10. Course Team

EUcare4.0 training materials have been created by specialist in each field belonging to the following institutions.

Table 10: EUcare4.0 Partner list

ID	Partner	Acronym
P1	ECAM-EPMI Graduate School of Engineering (E10010387 - France)	ECAMP-EPMI
P2	UNIVERSIDAD CARLOS III DE MADRID (E10209131 - Spain)	UC3M
P3	Ordinul Asistentilor Medicali Generalisti, Moaselor si Asistentilor Medicali din Romania Filiala Iasi (E10037887 - Romania)	OAMGMAMR
P4	SC Ludor Engineering SRL (E10109809 - Romania)	Ludor
P5	EFCC Estonian Fieldbus Competency Centre OÜ (E10103824 - Estonia)	EFCC
P6	SESCAM Gerencia de Atención Integrada de Guadalajara. (E10271469 - Spain)	SESCAM

Figure 6: EUcare4.0 partnership logos

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Annex 1: EUcare4.0 Templates

Annex 1.1 EUcare4.0 Course Summary

PhyMEL-Course_1SheetVertical_Narrow				Adapted for: EUCARE40 Project By: Carmen Fernández-Panadero Date: 28/02/2022 Version:v1						

EUCARE4.0 TRAINING MODULES

WHEN			WHAT (Content)			WHO			WHY (Purpose)		
Length (min)			Module Title	Description		VET-Trainers	Mid-managers	Senior Managers	Objectives	LOutcomes	Competencies

Path-1: STRATEGY (3 Modules, 15 hours)

300	M1		Introduction to Industry 4.0 (5 hours)								
20		S1	**Motivation**: How it has evolved?	This module **describes what are the 4-revolutions** and what are the main important milestones (data/facts/events) to know before entering Industry 4.0	Industry 4.0	x	x	x			
120		S2-S5	**Basic topics**: Strengths (S2), Weaknesses (S3), Opportunities (S4) and Threats (S5)								
20		S6	**Case study**: What to look for/expec of this **Revolution**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								
300	M2		Introduction to Health 4.0								
20		S1	**Motivation**: How it has evolved?	This module shows **lesson learned** applying Industry 4.0 techniques to the healthcare sector.	Health 4.0	x	x	x			
120		S2-S5	**Basic topics**: Strengths (S2), Weaknesses (S3), Opportunities (S4) and Threats (S5)								
20		S6	**Case study**: What to look for/expec of this **Revolution**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								
30	M3		Application of Health 4.0 to mental health sector								
20		S1	**Motivation**: How it has evolved?	This module shows what are the **challenges and opportunities** from applying Health4.0 techniques in the specific sector of mental health .	Mental Health 4.0	x	x	x			
120		S2-S5	**Basic topics**: Strengths (S2), Weaknesses (S3), Opportunities (S4) and Threats (S5)								
20		S6	**Case study**: What to look for/expec of this **Revolution**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								

Path-2: SUCESSFULL STORIES (3 Modules, 15 hours)

300	M4		Introduction to mHealth and eHealth								
20		S1	**Motivation**: Why are they important?	This module presents eHeath and mHealth as examples of **two technologies that have already reached a certain maturity** in the health sector and explores the opportunities/challenges of application to the specific sector of mental health.	eHealth & mHealth	x	x				
120		S2-S5	**Basic topics**: How impact on People (S2), Home environments (S3), Work environments (S4) and Society (S5)								
20		S6	**Case study**: What to look for/expec of this **successful story**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								
300	M5		Mental health apps								
20		S1	**Motivation**: Why are they important?	This module explores in more depth the application of **mHealth** to the mental health sector by showing some concrete examples of application.	Mental health app	x	x				
120		S2-S5	**Basic topics**: How impact on People (S2), Home environments (S3), Work environments (S4) and Society (S5)								
20		S6	**Case study**: What to look for/expec of this **successful story**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								
300	M6		Telepsychiatry								
20		S1	**Motivation**: Why is it relevant?	This module explores in more depth the application of **eHealth** to the mental health sector, specifically to the field of telepsychiatry.	Telepsychiatry	x	x				
120		S2-S5	**Basic topics**: How impact on People (S2), Home environments (S3), Work environments (S4) and Society (S5)								
20		S6	**Case study**: What to look for/expec of this **successful story**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								

Pah-3: ENABLING TECHNOLOGIES (4 Modules, 20 hours)

300	M7		Internet of things for mental healthcare								
20		S1	**Motivation**: Why is it relevant?	This module introduces IoT technology , how does it works, and why is relevant to the mental health sector. Introduce key technology (devices, infrastructures and communication) that are necessary to successfully implements an IoT strategy at the workplace.	IoT	x					
120		S2-S5	**Basic topics**: Devices,(S2) Infrastructures (S3), Communication (S4) and User Experience (S5)								
20		S6	**Case study**: What to look for/expec of **a given scenario using this technology**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								
300	M8		Big data for mental healthcare								
20		S1	**Motivation**: Why is it relevant?	This module explains what Big Data is, why is relevant to the mental health sector and what are the key process required to create a big data strategy for the enterprise using a case study as an example of application.	Big Data	x					
120		S2-S5	**Basic Topics**: Data Types (S2), Reading and cleaning (S3), Describing and exploring (S4), Modeling and transforming (S5)								
20		S6	**Case study**: What to look for/expec of **a given scenario using this technology**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								
300	M9		Artificial Intelligence for mental healthcare								
20		S1	**Motivation**: Why is it relevant?	This module explains basic concepts around Artificial Intelligence and its models of inference, It also introduce why is relevant to the mental health sector and how to create an strategy to introduce AI at their workplace using a case study as an example of application.	AI	x					
120		S2-S5	**Basic Topics**: Inference Models (S2), Clustering and Classification (S3), Pattern recognition (S4), Prediction (S5)								
20		S6	**Case study**: What to look for/expec of **a given scenario using this technology**								
15		S7	Recap, Conclusions and Future trends								
125		E,Q	Exams and Quality Control								
300	M10		Mixed reality (AR/VR) for mental healthcare								
		S1	**Motivation**: Why is it relevant?	This module introduces Mixed realty, similarities and differences between virtual and augmented reality and in which cases it is more recommended to use one or the other. Finally, it presents multimodal devices as one of the main challenges to deploy the technology at the workplace.	Mixed reality (AR/VR)	x					
		S2-S5	**Basic Topics**: Milgrams's continuum (S2), AR-Augmented Reality (S3), VR-Virtual Reality (S5), Multimodal interfaces (S6)								
		S6	**Case study**: What to look for/expec of **a given scenario using this technology**								
		S7	Recap, Conclusions and Future trends								
		E,Q	Exams and Quality Control								

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PhyMEL-Course_SheetTemplate(SideA)			Adapted for: EUcare40 Project By: Carmen Fernández-Panadero Date: 28/02/2022 Version:v1		

EUCARE4.0 TRAINING MODULES					
WHEN			**WHAT (Content)**		**WHO**

Length (min)			Module Title	Description	VET-Trainers / Mid-managers / Senior Managers
Path-1:	**STRATEGY (3 Modules, 15 hours)**				
300	M1		**Introduction to Industry 4.0 (5 hours)**		Industry 4.0
20		S1	**Motivation**: How it has evolved?	This module **describes what are the 4-revolutions** and what are the main important milestones (data/facts/events) to know before entering Industry 4.0	x x x
120		S2-S5	**Basic topics**: Strenghts (S2), Weaknesses (S3), Opportunities (S4) and Threats (S5)		
20		S6	**Case study**: What to look for/expec of this **Revolution**		
15		S7	**Recap, Conclusions and Future trends**		
125		E,Q	Exams and Quality Control		
300	M2		**Introduction to Health 4.0**		Health 4.0
20		S1	**Motivation**: How it has evolved?	This module shows **lesson learned** applying Industry 4.0 techniques to the healthcare sector.	x x x
120		S2-S5	**Basic topics**: Strenghts (S2), Weaknesses (S3), Opportunities (S4) and Threats (S5)		
20		S6	**Case study**: What to look for/expec of this **Revolution**		
15		S7	**Recap, Conclusions and Future trends**		
125		E,Q	Exams and Quality Control		
30	M3		**Application of Health 4.0 to mental health sector**		Mental Health 4.0
20		S1	**Motivation**: How it has evolved?	This module shows what are the **challenges and opportunities** from applying Health4.0 techniques in the specific sector of mental health .	x x x
120		S2-S5	**Basic topics**: Strenghts (S2), Weaknesses (S3), Opportunities (S4) and Threats (S5)		
20		S6	**Case study**: What to look for/expec of this **Revolution**		
15		S7	**Recap, Conclusions and Future trends**		
125		E,Q	Exams and Quality Control		
Path-2:	**SUCESSFULL STORIES (3 Modules, 15 hours)**				
300	M4		**Introduction to mHealth and eHealth**		eHealth & mHealth
20		S1	**Motivation**: Why are they important?	This module presents eHeath and mHealth as examples of **two technologies that have already reached a certain maturity** in the health sector and explores the opportunities/challenges of application to the specific sector of mental health.	x x
120		S2-S5	**Basic topics**: How impact on People (S2), Home environments (S3), Work environments (S4) and Society (S5)		
20		S6	**Case study**: What to look for/expec of this **successful story**		
15		S7	**Recap, Conclusions and Future trends**		
125		E,Q	Exams and Quality Control		
300	M5		**Mental health apps**		Mental health app
20		S1	**Motivation**: Why are they important?	This module explores in more depth the application of **mHealth** to the mental health sector by showing some concrete examples of application.	x x
120		S2-S5	**Basic topics**: How impact on People (S2), Home environments (S3), Work environments (S4) and Society (S5)		
20		S6	**Case study**: What to look for/expec of this **successful story**		
15		S7	**Recap, Conclusions and Future trends**		
125		E,Q	Exams and Quality Control		
300	M6		**Telepsychiatry**		Telepsychiatry
20		S1	**Motivation**: Why is it relevant?	This module explores in more depth the application of **eHealth** to the mental health sector, specifically to the field of telepsychiatry.	x x
120		S2-S5	**Basic topics**: How impact on People (S2), Home environments (S3), Work environments (S4) and Society (S5)		
20		S6	**Case study**: What to look for/expec of this **successful story**		
15		S7	**Recap, Conclusions and Future trends**		
125		E,Q	Exams and Quality Control		

WHY (Purpose)		
KNOWLEDGE	O1	Be knowledgeable about key milestones that **motivates** evolution of the <Module>. Identify relevant key **data/facts/events**, to profesionaly be able to **argue using SWOT why in important/urgent** introduce the <Module> at their workplace
	LO1	Be knowledgeable about key stakeholders needs that **justify introducing** the module. Identify **stakeholders needs** that, to professionally recognize **triggers that shows the opportunity for the stakeholders** to introduce <Module> at the workplace
	C1	Be **knowledgeable** about Key concepts of the <Module>. Identify **key concepts** to professionaly gaing working knowledge **to make better decisions** about <Module> at the workplace
PROCEDURES	O1	**Perform basic skills** related to key procedures of <Module>. Diferenciate use and organize simple steps to build **key procedures** to professionally be able to supervise them **reinforcing best practices and avoiding errors** at the workplace
	LO1	**Evaluate critically** a given case study. Apply performance checklists (rubrics) to a **case given study** that summarize <Module> to professionaly identify main **elements to look for in** proposed external solutions to choose the most appropiate one
	C1	**Develop a job-transferable project**. Codesign/create/share a **new case study** to professsionally be able to **autonomously outline a case study** to introduce <Module> at the workplace
ATTITUDES	O1	Practice 5C of **teamwork**. Indentifiy coworkers and collaborating with them to codesign a project to professionally be able to identify relevant stakeholders (Allies/enemies) for introducing <Module> at workplace
	LO1	Practice **communication and sharing** during the course. **Manage authorship/references/licences** to be able to **communicate/ share** final products related to <Module> in an effective way to maximize the likelihood of introducig <Module>
	C1	**Practice common task digitally** such as, read/create/communicate/share in order to **gain effciency in relevant task** for introducing <Module> at work

PhyMEL-Course_SheetTemplate(SideB)			Adapted for: EUcare40 Project By: Carmen Fernández-Panadero Date: 28/02/2022 Version:v1				
EUCARE4.0 TRAINING MODULES							
WHEN		**WHAT (Content)**			**WHO**		
Length (min)		Module Title	Description		VET-Trainers	Mid-managers	Senior Managers
Pah-3:	**ENABLING TECHNOLOGIES (4 Modules, 20 hours)**						
300	**M7**	**Internet of things for mental healthcare**					
20	S1	**Motivation**: Why is it relevant?	This module introduces IoT technology , how does it works, and why is relevant to the mental health sector. Introduce key technology (devices, infrastructures and communication) that are necessary to successfully implements an IoT strategy at the workplace.	IoT	x		
120	S2-S5	**Basic topics**: Devices,(S2) Infraestructures (S3), Communication (S4) and User Experience (S5)					
20	S6	**Case study**: What to look for/expec of **a given scenario using this technology**					
15	S7	**Recap, Conclusions and Future trends**					
125	E,Q	Exams and Quality Control					
300	**M8**	**Big data for mental healthcare**					
20	S1	**Motivation**: Why is it relevant?	This module explains what Big Data is, why is relevant to the mental health sector and what are the key process required to create a big data strategy for the enterprise using a case study as an example of application.	Big Data	x		
120	S2-S5	**Basic Topics**: Data Types (S2), Reading and cleaning (S3), Describing and exploring (S4), Modeling and transforming (S5)					
20	S6	**Case study**: What to look for/expec of **a given scenario using this technology**					
15	S7	**Recap, Conclusions and Future trends**					
125	E,Q	Exams and Quality Control					
300	**M9**	**Artificial Intelligence for mental healthcare**					
20	S1	**Motivation**: Why is it relevant?	This module explains basic concepts around Artificial Intelligence and its models of inference, It also introduce why is relevant to the mental health sector and how to create an strategy to introduce AI at their workplace using a case study as an example of application.	AI	x		
120	S2-S5	**Basic Topics**: Inference Models (S2), Clustering and Classification (S3), Pattern recognition (S4), Prediction (S5)					
20	S6	**Case study**: What to look for/expec of **a given scenario using this technology**					
15	S7	**Recap, Conclusions and Future trends**					
125	E,Q	Exams and Quality Control					
300	**M10**	**Mixed reality (AR/VR) for mental healthcare**					
	S1	**Motivation**: Why is it relevant?	This module introduces Mixed realty, similarities and differences between virtual and augmented reality and in which cases it is more recommended to use one or the other. Finally, it presents multimodal devices as one of the main challenges to deploy the technology at the workplace.	Mixed reality (AR/VR)	x		
	S2-S5	**Basic Topics:** Milgrams's continuum (S2), AR-Augmented Reality (S3), VR-Virtual Reality (S5), Multimodal interfaces (S6)					
	S6	**Case study**: What to look for/expec of **a given scenario using this technology**					
	S7	**Recap, Conclusions and Future trends**					
	E,Q	Exams and Quality Control					
WHY (Purpose)							
KNOWLEDGE	O1	Be knowledgeable about key milestones that **motivates** evolution of the <Module>. Identify relevant key **data/facts/events**, to profesionally be able to **argue using SWOT why in important/urgent** introduce the <Module> at their workplace					
	LO1	Be knowledgeable about key stakeholders needs that **justify introducing** the module. Identify **stakeholders needs** that, to professionally recognize **triggers that shows the opportunity for the stakeholders** to introduce <Module> at the workplace					
	C1	Be **knowledgeable** about Key concepts of the <Module>. Identify **key concepts** to professionally gaing working knowledge **to make better decisions** about <Module> at the workplace					
PROCEDURES	O1	**Perform basic skills** related to key procedures of <Module>. Diferenciate use and organize simple steps to build **key procedures** to professionally be able to supervise them **reinforcing best practices and avoiding errors** at the workplace.					
	LO1	**Evaluate critically** a given case study. Apply performance checklists (rubrics) to a **case given study** that summarize <Module> to professionally identify main **elements to look for in proposed external solutions to choose the most appropiate one**					
	C1	**Develop a job-transferable project**. Codesign/create/share a **new case study** to professsionally be able to **autonomously outline a case study** to introduce <Module> at the workplace					
ATTITUDES	O1	Practice 5C of **teamwork**. Indentifiy coworkers and colaborating with them to codesign a project to professionally be able to identify relevant stakeholders (Allies/enemies) for introducing <Module> at workplace					
	LO1	Practice **communication and sharing** during the course. **Manage authorship/references/licences** to be able to **communicate/ share** final products related to <Module> in an effective way to maximize the likelihood of introducig <Module>					
	C1	**Practice common task digitally** such as, **read/create/communicate/share** in order to **gain effciency in relevant task** for introducing <Module> at work					

Course content 2 ECTS (50h)

Module	Description	Duration (hours)
PATH-1	**STRATEGY. Strenghts , Weaknesses,Opportunities and Threats**	**15**
M1	Introduction to Industry 4.0	5
M2	Introduction to Health 4.0	5
M3	Application of Health 4.0 to mental health sector	5
PATH-2	**SUCESSFUL STORIES. How impact on People, Environmentes (Home/work) and Society**	**15**
M4	Introduction to mHealth and eHealth	5
M5	Mental health apps	5
M6	Telepsychiatry	5
PATH-3	**ENABLING TECHNOLOGIES. Why are they important and how to develope a strategy to introduce them at the workpla**	**20**
M7	**IoT** for mental healthcare. Devices, Infraestructures , Communication and User Experience	5
M8	**Big data** for mental healthcare. Data Types , Reading/cleaning , Describing/exploring, Modeling/transforming	5
M9	**Artificial Intelligence** for mental healthcare. Inference Models, Clustering/Classification, Pattern recognition, Prediction	5
M10	**Mixed reality (AR/VR)** for mental healthcare. Milgrams's continuum AR, VR, Multimodal interfaces	5
	Total :	**50**

Annex 1.2 EUcare4.0 Training Modules based on PhyMEL Templates (Example)

PhyMEL-Module_1SheetTemplate(SideA)

INTRODUCTION TO INDUSTRY 4.0 (Side-A) 5H (0,2 ECTS)

Adapted for: EUcare40 Project By: Carmen Fernández-Panadero   Date: 28/02/2022   Version:v1

WHAT (Content)

Average processing speed
250 words per min (**wpm**) for reading 125wpm for listening (scripts)

Examples: to **Listen** (video/podcast), to **Read** (Graphic, lecture), **FA:** Formative Assessment,
SA: Sumative Assessment , **Survey**

HOW (Methodology)

Cognitive load
(No more than 90 min per task)

Sx	SubSection	Dur (min)	Lecture L	Lecture R	FA	Activities SA	Surveys S	EI	Certification KPI	%
S1	Why is it so important? Motivation and leveling	20	x	x			Initial (Si)			
S2	Strengths	30	x		x	x				
S3	Weaknesses	30	x		x	x			Non certifiable	
S4	Opportunities	30	x		x	x				
S5	Threats	30	x		x	x				
S6	Case Study. Connecting all lesson learned in a complex strategy/scenario	20	x	x	x					
S7	Recap, conclusions and assessments solutions	15	x							
R	References									

E: Exams: 120

Ei							Ei	KPI	%
E1	Test. Theory (remember/understand key concepts) and practice (apply/ analyze	15		x				E1	6/10	70%
E2	Performance checklist of a given case study. (Critical evaluation using	15		x				E2	6/10	10%
E3	Project Deliverable: New case study aplicable to their own workplace.	90		x				E3	6/10	20%
Q	Continuous improvement satisfaction survey (Learner/Teacher/Others)	5					Final (Sf)		Non certificable	
			110	10	55	115	10			
Total		300	120			170	10			

WHO (Target groups)

Target Groups:

TG	Role (Description)	Adapt: **Knowledge** (nº modules), **Physical-Mental-Emotional Domains**, Language	K	Phy	M	E	L
		Describe adaptation:					EN, FR,
R1:	VET-Trainers (Train and implement)	nº of modules	1-10				ES, RU,
R2:	Mid-Managers (Negotiate Str. decision)	nº of modules	1-6				ET
R3:	Senior-Managers (Decides strategy)	nº of modules	1-3				

WHY (Purpose)

Objectives-Course focused (O), Learning Outcomes-Learner
focused (LO) and Competencies-Job focused (C)

	Technical (Bloom Taxonomy)								Non-Technical	
	Knowledge		Procedure						Attitudes	
	O1	O2	O3	O4	O5	O6	O7	O8	O9
	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
	C1	C2	C3	C4	C5	C6	C7	C8	C9
S1	x	x							
S2			x	x					
S3			x	x					
S4			x	x					
S5			x	x					
S6					x				
S7	x	x	x	x	x				
E1	x	x	x	x					
E2					x				
E3						x	x	x	x

WHEN (Duration/ Pace)

Length: 300 mins (5h)

Pace: 1 Module per week , between 5-90 min per task

WHERE (Context)

Delivery Method: Online

Resourrces:

R1: Device with internet access
R2: Multimedia Capable browser
R3:

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INTRODUCTION TO INDUSTRY 4.0 (Side-A)   5H (0,2 ECTS)

WHY (Purpose)

At their Learning Stage (Bunch)	Course Objectives — Will be able to: (Ox)	Learning Outcomes — By performing on time and with an aceptable quality standard (KPI) the following tasks:	Competencies — To professionally be able to (Cx)	#
UNconscious INcompetence — No knowledge but motivated to learn (EXPLORER)	Demonstrate knowledge (remembering and understanding) about key milestones that **motivates** the evolution of	Identify, select and classify key **data/facts/events** relevant in the evolution of	**Argue using SWOT** (Strenghts, Weaknesses, Opportunities and Threats) why is **important/urgent** to introduce	1
	Demonstrate knowledge (remembering and understanding) about key stakeholders needs that **justify introducing**	Identify, select and classify key **stakeholders needs** that justify the introduction of	Recognice main **triggers that shows the opportunity for the stakeholders** to integrate	2
Conscious INcompetence (NOVEL)	Demonstrate **knowledge** (remembering and understanding) about key concepts of	Identify, select and classify **key concepts** related to	Gain working knowledge about key concepts to make **better informed decisions** about	3
Basic Knowledge (BEGINNER)	Perform **basic skills** (applying and analyzing) related to key procedures of	Diferenciate, use and organize simple steps to build **key procedures** related to	Gain working knowledge about key procedures (identify and organize individual steps) to be able to supervise them **reinforcing best practices and avoiding common errors** applying	4
Intermediate knowledge: Knows-HOW	Integrate **critical thinking** (evaluating) a given Case Study about how to introduce in a professional environment	**Evaluate a given case study** by applying performance checklists (rubric) to a strategy/scenario that summarize key concepts and process related to	Identify main **elements to look for in a proposed external solution** to evaluate which of the available options is most suitable for introducing	5
Conscious Competence — Advanced K (Shows-HOW) — CERTIFIED	**Autonomously develop** an original job-transferable project (Creating) about how to introduce	**Co-desing, create and share a new case study** (strategy/scenario) that summarize how to apply key concepts and process related to	Be able to **autonomously outline a case study** (strategy/scenario) for introducing	6
INITIATED	Practice **5C of teamwork** (identifying Common purpose, Clear expectations per rol, **Communicate** results, Collaborate to align and learning from Consequences.)	Identify **co-workers and colaborate with them** during project design by identifying roles, sharing and disscussing ideas and reaching a common solution.	**Identify relevant stakeholders and their role** (alies and enemies) for introducing	7
Profesional knowledge: knowledge+Attitude	Practice **communication and sharing** of final products in an ethical way Knowing the basic rules for citing authors, references and licenses.	**Manage authorship**, citations to external **references** and creative commons **licenses** of their own creations before sharing online.	Be able to **communicate and share final products** (strategies/scenarios) in **an effective way** to maximize the likelihood of introducing	8
	Practice performing common tasks digitally such as learn, create, communicate or share	By **processing MM content**, filling out interactive **tests**, performance **checklist** and **survey**, creating and sharing **documentation**, and **communicating** online with co-workers/other	Gain experience performing **job-relevant tasks in a digital environment to be more efficient** doing tasks such as learn (facts, concepts, skills), critical thinking and content creation required for introducing	9
Unconscious competence (Expert Knowledge) — MASTER		Obtained after 10.000h of deliberate practice Not applicable to the module length		10

Markers across stages: INDUSTRY 4.0 · CERTIFIED · INDUSTRY 4.0 at their own workplace

Left axis labels: WHO (Learner) · Learner · Minor's pyramid · With these (T / NT / G) · Knowledge / Procedures / Attitudes · Teamwork / Communicate / Digital · L1/L2 Remember/Understand · L3/L4 Apply/ · L5 Evaluate · L6 Create · Professional · Motivated to Learn · Knows WHAT · Knows HOW · SHOW HOW · DO · DO with correct attitude · Train oth... · EXPLORER / NOVEL / BEGINNER / INITIATED / MASTER

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