



Building Skills 4.0 through University and Enterprise Collaboration

SHYFTE 4.0

WP3: WP Quality Plan

D3.3: Sustainability Assurance Plan

vs:2.0

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1. Executive Summary

One of the main goals of the Shyfte 4.0 project is to develop Learning Centers of Excellence for each of the four domains of expertise:

- **Domain 1:** Industrial Engineering & Management
- **Domain 2:** Software Engineering & Big Data Analytics
- Domain 3: Wireless Networks Analytics
- Domain 4: Artificial Intelligence

The objective is to offer students and companies in the partner countries a learning platform that will enable them to increase their skills and meet the requirements and needs of the industry of the future.

This deliverable describes the sustainability assurance plan designed for higher education institutions in partner countries to ensure the continuation of this key activity beyond the end of the project.

To design the sustainable assurance plan, we were inspired by the sustainable report assurance developed in the companies and the quality assurance processes developed in HEI's.





2. What is Sustainability Report Assurance?

According to ESG – the Report [1], a sustainability report assurance is "an assessment of a company's environmental, social and economic impacts on its stakeholders. It looks at how the company operates, its strategy for future sustainability and its achievements in this area. The goal of sustainability reporting is to make it easier for investors, customers, employees and other key stakeholders to understand how well companies are managing their impact on society and the environment".

An independent Sustainability Report Assurance services ensure that a company's report follows certain standards and can provide assurance about its credibility. This builds more confidence between stakeholders and companies using the information within the report.

Assurance services confirm that the company is reporting in line with international standards, which may be required by law or internal policy; this allows companies to avoid using costly resources to create their own guidelines for reporting.

2.1 Why do we need a sustainability assurance plan in HEI's?

What is quality assurance in HEI's? "An all-embracing term referring to an ongoing, continuous process of evaluating (assessing, monitoring, guaranteeing, maintaining, and improving) the quality of a higher education system, institutions, or programmes. As a regulatory mechanism, quality assurance focuses on both accountability and improvement, providing information and judgments (not ranking) through an agreed upon and consistent process and well-established criteria" [13].

Education is an important enabler for economic uplift of a society and academic institutions need to deliver quality education to equip students with required skills to excel in their professional careers. Fostering quality assurance processes for skilling and upskilling students requires careful planning and active collaboration among universities, industry and government.

It is critical that academic programs should develop required skills in graduates to improve their employability. Adopting an effective assessment strategy is the key for continuous improvement.





2.2 Quality Assurance in Shyfte 4.0 Learning Centers

Quality Assurance (QA) Procedures are part of the QA Strategy that is developed for the implementation and the sustainability of the Shytfe project.

The QA procedures are based on qualitative data (i.e. assessment of the Learning Centers) and on quantitative data (i.e. answers to questionnaires). Data are gathered from all project partners and key stakeholders (trainers, staffs, students, SME's...).

The QA Procedures are based on a QA Indicators, and internal & external evaluations:

Internal QA evaluation: Internal QA evaluation includes the development of the main following standard templates/guidelines:

- Internal learning material review
- Internal Training of the Trainers review
- Internal Training of the Students review
- Feedback forms for Learning Centers internal evaluation (level of satisfaction, challenges faced, recommendations for improvement).

External QA evaluation: The external QA evaluation is performed in close cooperation with the European and Asian experts of the associated partners, of other universities of the partners countries, and other stakeholders. The experts have a role of adviser to the universities on the strategic orientation of the Learning Centers and its sustainability. External QA evaluation mechanisms will include:

- The learning framework per domain (skills sets, modules, maturity level of the trainees...)
- The Learning materials (learning methods/approach, modules' syllabus, industrial use cases, equipment used...)
- Training of the Trainers (ToT) evaluation questionnaire will be distributed at the end of each training session, to assess their satisfaction and gather feedback and possible suggestions for improvement.
- At the end of each training session, a questionnaire will be sent out to staff having participated in the training sessions to assess to what extent the skills developed during the session were put into practice.





Training of Students (ToS) evaluation questionnaires will be distributed at the end of each training session, to assess their satisfaction and gather feedback and possible suggestions for improvement.

Experts feedback will be essential to properly guide the project's actions and validate Shyfte's results, especially considering its main objective which is to contribute to providing an answer to the gap between the skills requirements by SMEs and the existing curricula in the partner countries' universities.





3. Shyfte 4.0 Sustainability assurance plan

To ensure the sustainability of the Learning Centers it's necessary to define a Sustainability Assurance Plan. This sustainability plan is designed with the HEIs partners and SMEs, and it focuses on the following three axes:

- a. A Quality Assurance Plan (QAP) for the continuous improvement of the learning materials
- b. An Industrial Observatory: integrated in the Learning Centers, this observatory allows the monitoring of the companies' activity and their satisfaction. It also provides an SME survey to assess the Learning Centers indicators.
- c. A Sustainability Assurance Plan (SAP) plan to ensure that the activities of the Learning Centers will continue beyond the end of the project

3.1 Learning Centers Quality Assurance Plan (QAP)

The Shyfte Learning Centers propose several training services which are available for two types of users: HEI trainees and SME trainees. In terms of visualization interface, the former are offered the training domains of Shyfte. The latter are presented with the upskill service and allowed to select competencies in one of the Shyfte domains.

After selecting the aim of the training, users fill out a questionnaire to acquire a skills and competencies profile. Next, users receive a proposal for customized training. Once training is accomplished, users are invited to fill out a quality questionnaire, which is the base for the Learning Center Quality Evaluation.

The Quality Management System developed for the Learning Centers is based on several services and processes:







Figure 1. Quality Training processes for HEI trainees and SME trainees + Quality Dashboard According to the Learning Centers services, and following the training sessions carried out, the training quality questionnaire makes it possible to evaluate the quality of the training from the point of view of both its content and its delivery. This questionnaire is detailed in **Deliverable D3.2 "Quality Audits"**. It consists of the following main questions:

- Q1. Did the trainer(s) assign the correct workload?
- Q2. Did the trainer(s) provide suitable learning material to teach the specific topic?
- Q3. Did the learning method of trainer(s) stimulate interest in the specific topic?
- Q4. The degree of explanation of the trainer(s) is adequate for this topic?
- Q5. Do you think that the trainer(s) owns complete experience to teach this topic?
- **Q6**. Do you think to understand the most part of explanation?
- Q7. Did the trainer(s) expose focus on practical cases?





- **Q8**. Did your trainer(s) respond to your queries in a timely manner?
- Q9. After attending this training, are you comfortable to be a trainer yourself?

The user can leave their feedback about a module he/she participated in. In the following figure the active button of module 88 ("submit self-evaluation") is shown to provide feedback, which means that the trainee can evaluate the quality of the training execution.

LEARNING LEARTER PLATFORM		EATER PLATFORM
Module 94 Data Governance and Management	Module 101 IoT System Design	Module 102 Management of Heterogeneous Network
View course	View course	View course
Hist Applied Undershifter Auto Exploration	Hor Applied Dubnit the Auto Gostiantice	Not Applied Butterit the Auto-Contaction
ELERENING CENTRE PLATFORM		
Module 88 Antenna Design and Fabrication		
View course		

Figure 2. Quality Training processes for HEI trainees and SME trainees.

Then the trainee gets access to a page where may answer some quality questions (see next figure).



Figure 3. Quality evaluation of the module - 88

Afterwards the user can see his/her answer against the results of the overall in relation to such module (see next figures).



Figure 4. Quality evaluation feedbacks Interface

Moreover, all the feedbacks can be seen by the quality manager of the Learning Center (LC) through the dashboard page shown in the following figure. Thus, there is a section called "Overall training Observatory" that gives access to three different dashboards.

SHYFTE	Co-funded by t Erasmus+ Program of the European Unit	the me
	ම්ඩ වැඩ න් 🔲 😣 🔅 Welcome shyftegester Legent	
Home Domain Module Date Artificial Intelligence v All v East day v Filter		
Overall Training Observatory TRAINING QUALITY FEEDBACK		
► TRAINING INTERACTIONS STATISTICS		
► TYPE OF TRAINEES STATISTICS		
Overall Training Exploitation Observatory		
► ORGANISATIONAL TRAINING STATISTICS		
► TECHNOLOGY CREATION STATISTICS		

Figure 5. Quality Training Observatory Dashboard

The training Quality Feedback gives access to the different modules provided feedback from the trainees as may be seen in the next figure. The next figure shows the training feedback overview of all the modules of the domain "Artificial Intelligence". The user may see the feedback of a specific module if that specificity is chosen. In the top of the next figure, it is shown the different views able to be chosen in this quality tool.

c configurations block confi	purations Forms Taxonomy Users D	Jashboard							Welcome shyftegestor
ain	Module		late						
icial Intelligence	▼ All	•	Last year 🔹 Filter						
rall Training Obs	servatory								
RAINING QUALITY FEED	васк								
	200B								
			Número	total de feedbacks					
3.25									
3					Freedbacks				
2,75									
2.5									
2,25									
1,75 Jan	Feb	Mar Apr	May Ji	n Jul	Aug	Sep	50	Nov	Dec
				Month					
Q1. Was the prelimina	ry knowledge owned sufficient to under	rstand the topics?	Q.2. Is the leaching works	oad proportional to the work assigned?		Q.3. Is the leach	ing material (indicated an	id available) suitable for the	study of the
	Answers: 0, Average: 2.4		Ar54	ers: 0, Average: 2.4			Answers: 5, A	iverage: 3.8	
2. No more than yes: 20.	14		2. No more than yes: 20.0 %			3. Yes more than	ne: 20.0 %		
		1. Definitely not: 40,0 %		1. Definitely n	ot 40,0 %				

Figure 6. Quality Training Feedbacks

Based on the return of the questionnaires, an analysis is made to determine the level of satisfaction of the trainees after each training session. For example, after the Training of Trainers





sessions that took place during the Shyfte project, we observed the following results (132 respondents):



Figure 7. Examples of Quality Training KPI's

These Quality Training KPI's are integrated in the Quality Assessment Dashboard, which is a service presented to the quality Manager, for the visualization of the quality of the Learning Centre.

3.2 Learning Centers Industrial Observatory

Companies will use the Learning Center to train and improve the skills of their employees. One of the objectives of the Learning Center Industrial Observatory is to enable the partner universities to analyze the needs of companies in terms of skills and the evolution of the labor market.

We integrated in Learning Centers portal a solution able to act as an observatory of the innovations creation combining industry 4.0 related technologies. It also comprises a service to support such creations from the trainees.

- Each Learning Center, in each country will be an Observatory of the Industry 4.0 involvement in its country.
- We defined in each Learning Center a dashboard with different KPIs:





- o Number of enterprise registered in the Learning Center
- Number of salaries trained
- o Number of students trained
- Number of modules concerned

o

To this end, certain services are provided by each Learning Center to enable interactions with company representatives.

The main process developed in the Learning Center has considerable differences when comparing with the student's process. The user is a representative of a company and knows the current state of the company in some concepts in Industry 4.0 domain. That user also knows what is the target level that the company aims to achieve.

So, in the first step, the user will choose the Domain where the company fits in, secondly will choose the desired concepts of domain and the target level. Therefore, the system will present the enterprise's gap analysis and a custom training program. That training program consists of the identified modules to close the gap and could be assigned by the SME representative to one or more employees or even to himself.

The user can leave their feedback about a module when it is finished, then all the feedbacks can be seen in the dashboard page. The dashboard has information for all the main domains of the CEO, for trainees, training, and trainers.



Figure 8. Quality Assessment Dashboard

All the feedbacks can be seen in the Quality Assessment Dashboard:



tent Configurations Block Configurations Forms Taxonomy Users Dashboard					Welcome shyftegestor
e					
nain Module tificial Intelligence V All	Date Last year	Filter			
erall Training Observatory					
TRAINING QUALITY FEEDBACK					
		Número total de feedbacks			
3.25					
1					
2,75					
2.25					
2					
1,78 Jan Peb Mar	Apr May	Jun Jul Month	Aug Sep	off N	IN Dec
Q1. Was the preliminary knowledge owned sufficient to understand the Answers: 5. Average: 2.4	e topics? Q.2. Is t	the teaching workload proportional to the work assigned Answers: 5, Average: 2.4	Q.3. Is	the teaching material (indicated and available topic? Answers: 5, Average: 3.	e) suitable for the study of the
3. No more than yet: 21.0 %	2. No more than	HI 235	3. Yer	increthan no: 20.9 %	
					*

Figure 9. Overall training observatory (1/3)



Figure 10. Overall training observatory (2/3)



Figure 11. Overall training observatory (3/3)

Based on these results, key performance indicators and feedback, the partner universities will be able to better understand the behavior, requirements and needs of companies.

In addition to the quality assessment questionnaires, any question or information about the training programs can be asked in the training support form by selecting a domain and subject with the question.



Figure 12. – Providing information through training support.

In additional the trainees may provide overall feedback of the entire LC in relation to the training support. Any question or information about the training programs can be asked in the training support form by selecting a domain and subject with the question. This functionality is available from the LC main page as illustrated in the following two figures.





Training Support

We have expert trainers that can help you prepare your training programs and qualifications. For further inquiry about the training, please contact us.

Shyfte Domain *	
- Select -	•
Subject *	
- Select -	•
Write your message	
····· /-····	
	Submit

Figure 13. - Providing information through training support.

Also, this kind of interactions may be analysed by the quality manager in the training dashboard page already mentioned before. So such quality manager can check statistics regarding the interaction between the users and this overall quality form (see following figure).

* TRAINING INTERACTIONS STATISTICS												
	Número de interações total com o formulário											
Interaçõe								•				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	oct	Nov	Dec
						Month						
					Nú	úmero de interações	por subject					
Reset: 12/5 Genter: 12/5 Genter: 12/5												

Figure 14. LC - Number of interactions statistics per type (Comment; Remark; Question).





Additionally, there are also some other statistics available about the level of education and employment situation of the trainees that attended the courses/modules (see next figure).



Figure 15. LC - Level of education and employment situation of the trainees

And finally, there are the possibility to check the number of training programs generated per type of company that participated in the training of the LC (see figure below).

verall Training Exploitation Observatory					
▼ ORGANISATIONAL TRAINING STATISTICS					
Número de programas por "type of organization"					
MAL 192%					

Figure 16. LC - Number of training programs generated per type of company

A periodic analysis of these feedbacks, and the interactions with the users, will allow for the evolution of learning materials content and the development of new materials for learning center users. It will also provide a better understanding of the labor market related to the evolution of Industry 4.0.

3.3 Learning Centers Industrial Observatory Quality Assessment

After developing the Learning Center, an industrial workshop was organized in mixed mode, remotely and face to face, to present the Learning Center. This workshop lasted 2 hours and was held especially for the companies. The functionalities and services that the platform offers, the method of implementation, the set of skills were shown. The didactic material used during the





presentation was also provided. At the end of the workshop, the companies were asked to express their opinion through a short questionnaire.

1	How satisfied are you with the performance of the Learning Center presented?	Score
2	Do you believe that the Learning Center has the technical capabilities to meet your needs?	Score
3	Did the Learning Center meet your expectations?	Score
4	Do you think the Learning Center will be easy to use within your company?	Score
5	Will you recommend our Learning Center to other companies?	Score
6	Is there any part in the Learning Center that can be improved?	Comments

This survey validated the concepts developed in the Shyfte project, as well as the main functionalities proposed by the Learning Centers.

The Learning Center proposed a menu for the companies with a more innovative view about support and exists to help user's innovation that reflects the knowledge given by the learning center. This means that if the users have any problem with some project, either a prototype or just an idea, they can ask for extra help to all available trainers/researcher.

This way is possible to analyze information about know creators and innovation regarding the learning center.



Figure 17 – Technology creation or transfer support.

Technology Creation or Transfer Support	
We have experts that can assist you in preparing your innovations, in terms of design, us.	testing and exploitation. If you have any technical question you may consult
Contact us	
Subject *	
- Select -	`
Write your message	
	Submit

Figure 18 – Technology creation or transfer support.

Again, an account with access to the dashboard can check all the statistics regarding the interaction between the users and this form.



Figure 19 – Sample of technology creation statistics.

The principle is to make the link between the Learning Centers, the Industrial observatory (the registered companies in the Learning Center, the evaluation questionnaires...), and the Technology Transfer (innovation, creation...) to sustain the use of the Learning Centers.

3.4 Sustainability Assurance Plan (SAP)

To perpetuate the use of the Learning Centers we defined, with all the partners of the project HEIs and SMEs, a sustainability assurance plan for their quality certification.

The objective is to obtain ISO 9001 quality certification in the medium term. To achieve this, the Learning Centers have been designed based on a process approach in order to be compatible with ISO certification.

Procedures have been defined for the main steps of the main processes:

- registration of trainees,
- evaluation of their maturity level,
- training programs proposal,
- evaluation of training programs
- ...

Based on this, the sustainability plan, described below, is designed towards the designated HEIs of the Partners Countries to ensure the continuation of this key activity beyond the end of the project.





3.4.1 Shyfte Sustainability Assurance Plan

The plan to perpetuate the use of the Learning Centers has been defined by each partner in order to sustain their use. These sustainability actions have been described in deliverables D2.1 to D2.4 (which describe the 4 pilots developed within the project).

The key issues to ensure the sustainability of the Learning Centers are:

- The assessment of the Learning Centers' services and learning materials
- The quality certification of the LC (IS09001 processes QMS)
- The definition of a Business/Economic model
- The first level of sustainability is to reuse the learning materials developed in each of the pilots (courses, hands-on, use of equipment...). For this, depending on the partners, these modules will be integrated, partially or totally, into existing programs. For others, the modules will be proposed as optional modules that can be validated (credits) in existing programs. Finally, some modules will be integrated into the Long-life education platforms of the partner universities.
- The second level of sustainability concerns the Learning Centers. The principle is that the learning centers will last after the end of the project, and that the partner universities will rely on them to increase their collaboration with companies and other universities in their country. For this, the learning centers have been designed to allow a follow-up of the interactions (LC observatory). The partner universities will therefore continue to communicate and disseminate information to ensure that these Learning Centers become a real center of expertise. To guarantee the sustainability of the learning centers, the quality procedures put in place and the training of quality managers in internal audits will make it possible to consider quality certification (ISO 9001) for the Learning Centers within two years. This delay is necessary because to be certified, a learning center must have been used for a period.
- From an **economic point of view**, the partner universities are committed to continuing to invest in order to ensure the sustainability of the Learning Centers. They have clearly understood the value of these centers of excellence for the development of their students' skills and for promoting continuing education among companies. To this end, rates have been defined and will be integrated into the Learning Centers.





In addition to this global sustainable assurance plan some local actions were defined in each partner university.

3.4.2 Local actions for the Sustainability Assurance Plan

3.4.2.1 Pilot 1: Industrial Engineering & Business Management (CMU/KU)

To sustain Shyfte learning materials, we have planned to execute in two approaches as details follows:

1. Establishment of Shyfte learning center to Lifelong Education (LE) platform of CMU

CMU created the LE platform to promote lifelong learning education for all people (students, employees in private and public companies, retirement people, etc.). The LE platform enables anyone interested in available courses to register as a learner and attend a training course. Basic Courses, Reskill/Upskill Courses, and Advanced@CMU are available through CMU's CMU-Lifelong Education platform.



Figure 20 – CMU Lifelong Education Platform.

During the Shyfte last meeting in Chiang Mai, we discussed with Associate Professor Dr. Pradthana Jaipong, the director of the CMU School of Lifelong Education, how we plan to register the Shyfte modules in domain 1 to the Lifelong Education platform and use this platform as a channel to connect to the Shyfte learning center in all modules (domain 1 - 1)



domain 4). Thai students who participate in training modules through the LE platform can collect credits and transfer them to an individual credit bank. They can use these credits as part of their study program if they enroll in any university program (however, it depends on the criteria of curriculum of their program)

2. Development of short-course training and use in the undergraduates and postgraduates' program.

We plan to initiate the short courses for the student and SMEs practitioners to attend in these courses. In the short courses, we aim for re-skills and up-skills of the participants regarding Industry 4.0 with two main parts: 1) Industrial Engineering and 2) Management. For the first part, they will be involved with 6 modules (Introduction to IR4.0, Cloud ERP, Integrated simulation and optimization, Data collecting system, Automatic data collecting system, Decision-making with Big Data).

While the second part, they will be related to 5 modules (Human resource management for industry 4.0, Digital communication, Role of data for future organization, Business intelligence, and New product development). In addition, the modules may be added upon the current situation and prospective attendant's customization.

3.4.2.2 Pilot 2: Software Engineering & Big data Analytics (CUIT/CDU)

In this project, CUIT and CDU focus on Domain 2 Software Engineering and Big Data Analytics. Based on this field, the modules jointly developed by CUIT and CDU are as follows: 1). Principle and Application of BigData Technology; 2). Critical Thinking Oriented BigData; 3). Data Mining Ideology and Technology; 4). Comprehensive Training of Artificial Intelligence; 5). Smart Decision Making with BigData.

The above modules not only meet the requirements of higher education under the background of industry 4.0, but also are the focus of many enterprises in the information age. The training of these modules is conducive to cultivating many skilled talents for enterprises, so that the teaching, learning and enterprise requirements of student skills can form a harmonious system. In addition, in this project, the image data collected from the Learning Education Center is used to analyze students' learning situation, and students' learning efficiency and students' employability are analyzed through library and dormitory access data. The above data can also be applied in micro-expression recognition and multi-modal data processing. Not only that, the equipment involved in this project such as Mobile Workstation, Recording





Host, HD Camera Management Software, Graphics Workstation, Digital Display Terminal, Black and White Laser Output Terminal, HD Camera can also be used to record and analyze sound and video data to solve new scientific problems. According to the feedback of this training, our students are very interested in these modules, and they are highly satisfied with all aspects of the course. This gives us the confidence to add new modules to the Learning Education Center.

As the first theme of the series course "Software Engineering and Big data analysis", "Comprehensive Training of Artificial Intelligence" offers fundamental knowledge for big data analytics, aiming at training students to understand essential theory and practice application with experiments. The "Data Mining Ideology and Technology" module introduces the basic concepts of data mining and combines the current important data mining technology to explain and practice. The other three modules introduce big data from the aspects of the basic knowledge of big data, the modelling of real big data problems, and the critical thinking of big data. The above several modules not only provide a lot of basic knowledge about big data and artificial intelligence, but also use the current popular technology to complete some small cases, which can serve as pilot courses for the new modules. Most importantly, we have a large number of computer-related majors who can devote themselves to the follow-up training.

The 5 modules are integrated in the Learning Centre developed during the project. It allows students and people from companies to customize the training based on their profile. They could also pick and choose the modules they are interested in as part of their lifelong learning should they choose not to customize their training. The participants will pay a minimum cost once the project ends. The Learning Centre will be maintained and managed by CDU and CUIT once the project ends.

It can be seen from the above content that the developed modules meet the requirements for higher education under the background of Industry 4.0. There are sufficient students of computer-related majors and various equipment and collected data, which are the embodiment of the sustainability of Shyfte learning materials. This also laid the foundation for the integration of the new modules into the curriculum.





3.4.2.3 Pilot 3: Wireless Network Analytics (UPM)

Many training modules have been developed and a lot of dissemination programmes have been done to ensure the exposure of the Shyfte 4.0 to both students and enterprises. The Learning Centre for this domain is created to ensure the sustainability of the Shyfte 4.0. The website for this Learning Centre is created to reach out to public interested to upskill and reskill their Skill of IR 4.0.

The developed modules will be used in the undergraduates (UG) and postgraduates (PG) curriculum as listed in the following Table.

Module Title of Domain 3 of Shyfte Domain 3 : Wireless Network Analytics	Equivalent Undergraduate/ Postgraduate Course
1. Introduction to Cybersecurity	Computer Security
2. Data Acquisition and Analysis	Internet of Things
3. Data Governance and Management	Internet of Things
4. Introduction to Energy Management	Wireless Network
5. Renewable Energy for Wireless Network	Wireless Network
6. Green Energy Wireless Network	Wireless Network

Table: The list of modules and the equivalent undergraduate or postgraduate course.

This Learning Centre allows participants to customise the training based on their profile. They could also pick and choose the modules they are interested in as part of their lifelong learning should they choose not to customise their training. This Learning Centre will be maintained and managed by UPM via Wireless and Photonics Networks Research Centre (WiPNET) once the project ends.

We developed a simple business plan to ensure the sustainability of the Learning Centre such that participants will need to pay a minimum cost once the project ends. The existence of the Learning Centre is made know via social media and individual networking's.





3.4.2.4 Pilot 4: Artificial Intelligence (UTM)

To ensure the sustainability of the learning centre for the domain four, a few measures are proposed as follows:

- i. A continuous curriculum review on the existing and new academic programme is possible to include the Shyfte domain and modules that are relevant to Skill4.0.
- Learning is a lifelong journey. Acquiring new skills throughout life not only enhances wellbeing, but also employment prospects. Therefore, with regards to the Learning Centre, lifelong learning courses offering is essential.
- iii. To develop Micro-Credential (MC) courses for the domain modules. Each of the module will consist of several MC courses. The courses can be offered to the public at cost which can be used to support the running of the learning centre. Upon successful completion of the courses the participants will be awarded with the MC badges. Depending on the module level, the MC badges can be collected as evidence for upskilling or re-skilling by employees. In addition, the collected MC badges can also be used to obtain credit transfers for relevant academic programs.
- iv. To encourage credit transfer with European partners through European Credit Transfer and Accumulation System (ECTS).
- v. Develop Massive Open Online Courses (MOOC) based on the AI domain modules to be offered in relevant academic programs whether at postgraduate or undergraduate level. Students all over the world would be able to enrol in the MOOC offered and upon completion, the courses can be considered for acceptance in other relevant academic programs. Industry plays a critical role in specifying the skills needed today and into the future. Strengthening industry engagement is a key measure in Shyfte project is important in order to provide relevant training to employer needs and skills change hence boosting trainees' outcomes through better qualifications.





3.4.3 Learning Centers Quality Certification ISO methodology

The goal of this plan is the quality certification of the "Learning Center" according to ISO9001:2015 standards in the next 2 years. Within the certification program it is provided the operative formation of Quality Managers according to ISO9001 standards for the EA37 sector, to ensure the supply of quality training and professionalization courses. The formation program to integrate the education quality process into the learning center is the following:

1. Recall the regulations and principles of ISO9001: 2015. Structure of the standard.

Around every five years, the ISO 9001 Standard is subjected to thorough revision and updating in order to reflect changed conditions. Since its introduction in 1987, ISO 9001 has been through several stages on the way to its current form.

The first version of ISO 9001 was based on one British and one US-American military standard. It provided for three different quality management systems, depending on the business activities of the organization to be certified.

The first revision took place in 1994: it placed particular emphasis on the theme of quality assurance and recommended preventive measures, instead of merely checking the end product. Organizations were still structured in terms of individual departments and organizational units.

The year 2000 brought a radical revision and adaptation of the standard to modern management methods.

In place of quality assurance and control, concepts for quality management and process management at a deeper and more cross-departmental level were introduced; in addition, continual improvement of customer satisfaction came to the fore. Analysis of requirements, the process approach and the linking of different work processes became the focus of attention. Mere concentration on individual units within the organization gave way to a process-based way of seeing things, or in other words to an overall process landscape.

The new edition of 2008 did not bring about such far-reaching changes, but simply clarified some aspects of the standard. The most important new aspect of ISO 9001:2015 regards the establishment of the so-called High-Level Structure. The background is that all management systems are based on certain basic elements – including ISO Standards such as ISO 9001, ISO 14001 for environmental management, BS OHSAS 18001 for



occupational health and safety and ISO 27001 for information security. However, despite their close relationship with each other, these standards up to did not share a common structure. In order to make harmonised structure and wording possible for all the relevant standards, a structure with identical chapter structures, texts, terms and definitions has now been established for all management standards. This represents a very important step forward along the path to integrated management systems.

The ISO 9001 continues to be the main guide for organizations of all sectors and types, not only in order to determine the requirements of their customers, but also to fulfil them in the best possible way through provision of products and services.

2. Provide the main methodologies and global approach for the implementation of a Quality Management System

The implementation of a Quality Management System represents a fundamental point for the growth of the company business, considering its influence on:

- Preserving corporate assets and managed information (judicial, personal and in any case sensitive data);
- increase profits by reducing costs and optimizing resources;
- demonstrate its ability to provide compliant services that meet customer requirements and the requirements of applicable laws and regulations;
- increase customer satisfaction through the effective application of the system and continuous improvement processes and ensuring compliance with the requirements indicated by the customer and the applicable laws and regulations.

According to what has been said, the field of application of our QMS will be as follows: Design, Planning and supply of professional training courses, EA37 Sector.

Therefore, the definition of an Integrated Management Policy is a strategic point to support and guarantee the objectives that can be achieved.

3. Provide practical tools to build procedures and work instructions for the development of the Process Approach



When a company documents its QMS, it is an effective practice to clearly and concisely identify their processes, procedures and work instructions in order to explain and control how it meets the requirements of ISO 9001:2015. This begins with a basic understanding of the hierarchy of these terms and how to efficiently categorize the workings of a management system within them.

- A process states what needs to be done and why.
- A procedure states how the process needs to be done.
- A work instruction explains how to carry out the procedure.

Consider a process as a high level, strategic method of control, in effect a summary of objectives, specifications, and broad resources needed. The procedure adds more specifics such as responsibilities, specific tools, methods, and measurement. And a work instruction is a step-by-step guideline to implement the process and procedure, often segmented in some way to focus those who are doing the actual work.

4. Analyze the needs of the organization and the related documentary needs

All regulatory references relating to training and documents deriving from such legislation are subject to documentary control and verification and constantly updated.

The operating instructions are other documents containing, or in which to record, documented information and which are referred to in the Quality Manual and the Quality Procedures. These are plans, forms and cards, checklists, necessary to describe how to conduct certain activities, as well as instructions describing the operational practice and process control activities.

These quality registration documents (forms) are used in order to:

- give evidence of compliance with the specified requirements;
- obtain traceability information for improvement interventions on the service, process and quality system;
- provide data to be analyzed in the context of improvement actions.

5. Organize and identify the documentation of a Quality Management System.



6. Monitor and control the system (for analysis and improvement)

The specific procedures define the types of checks to be performed and the relative execution methods.

In general, the monitoring of processes is based on monitoring the progress of the courses. In the event of non-compliance with operational standards, immediate interventions are provided, such as the replacement of teachers, the use of different materials or classrooms, etc.

The results of the checks are reported on specific documents, described in the various procedures. These documents are signed by the person who carried out the checks and are properly filed.

Product monitoring takes place through final checks, carried out on each course delivered.

The results of the checks are reported on specific documents, described in the various procedures. These documents are signed by the person who carried out the checks and are properly filed.

The data deriving from monitoring and measurements are analyzed and evaluated during the management reviews, with the aim of providing elements to judge the quality trend, to intervene to correct any defects and to seek continuous improvement.

7. Implement internal audits - ISO 19011 analysis - Second party audits according to ISO9001: 2015

At scheduled time intervals, at least once a year, a series of inspections are carried out by internal auditors to verify compliance with the Quality Manual, Procedures, Operating Instructions, reference standards, and the results of improvement interventions.

These audits can also be performed on an unscheduled basis when deemed necessary (for example in the event of customer complaints, non-conformities, etc.).

The auditor in charge is defined for each internal audit, who agrees with the head of the unit being inspected the date of the audit, also informing him of the specific object of the audit.

The auditor is chosen from among people prepared for this task and not directly involved in the work being verified.



The results of these inspections and analyzes are reported in the Audit Reports.

These analyzes form the basis for the Management Review to decide and plan future interventions and to assign new objectives.

Documented information is kept, evidencing compliance with the Audit program, and the results of each Audit.

8. Management review process and quality policy

Before each review meeting, you are asked to provide data on the activity carried out and the problems to be solved, in order to verify the level of development of the QMS and activate the necessary decisions and investments.

These data concern:

- results of both internal audits and by the certification body
- list of non-conformities found, analyzes and results
- status and results of the corrective actions undertaken
- number of customer complaints with analyzes and results
- the status and results of the quality objectives and improvement activities
- results of customer satisfaction surveys
- update of the professional skills table any proposals for changes to the Quality System induced by expected changes in company products or processes or by internal and / or external suggestions
- summary of data on processes and / or services collected during the period
- results obtained from the actions planned in the previous review
- proposals for improvement actions to be activated by the Management.

The managers of the corporate functions examine such data, verifying them and deciding on these elements:

• the contents of the Quality Policy to ensure its relevance and consistency with the general strategy of the company



- the quality level of the products / services supplied with any improvement programs according to the Customer's requirements
- the adequacy of economic, human and instrumental resources with respect to the defined objectives
- the adequacy and effectiveness of the Quality System (organizational structure, degree of application, compliance with specified requirements) with the definition of any improvement programs also based on planned changes for services and / or business processes
- the implementation of the improvement interventions planned in the previous period (or the progress of the work if the intervention is not yet completed)
- the trend of quality indicators in relation to the quantified objectives for the previous period
- the definition of the new objectives for the following period
- preparation and analysis of the "risk table" with subsequent definition of the necessary actions.

A summary of the analyses carried out and the decisions taken is recorded in the Management Review report.

The review is carried out systematically once a year, however the Management can carry out a review at any time it is necessary.

9. Manage a Quality Management System through Total Quality Management

10. Expertise, training and awareness according to ISO9001: 2015

For each position that requires specific preparation, the Management defines the appropriate profile for the selection of new staff, for their mobility, for the preparation of training plans, for the assignment of teaching positions.

Training can take place through internally organized courses or at specialized external bodies.

For each training intervention, an evaluation of the results achieved is carried out, that is the professional improvement that took place in the person who participated in the training.



Each training or training intervention is reported on special forms that record its characteristics and results. They are archived and available for further consultation.

For each employee who occupies a position interested in the Quality System, a professional card is created and updated, which he keeps for the entire duration of the employment relationship.

11. Record the requirements in a QMS and customer satisfaction

Customer satisfaction is one of the primary objectives. This objective can be achieved by pursuing the continuous improvement of the ways in which the company proposes itself to the market and of the service delivery processes.

The quality manager limits himself to a thorough examination of customer complaints, but aims for greater knowledge through specific investigations.

The "customer" is actually made up of two different entities:

course participants and orientation activities

the clients of the course, and orientation activities

Systematic checks are carried out on the service provided in the various stages of the process. Further data is collected through the administration of questionnaires at the end of each individual initiative, to detect the satisfaction of participants and clients. The subject of the verification are:

• Participants:

- the teachers
- teaching methods
- the didactic material
- evaluation of the initiative as a whole
- other elements deemed useful
- Customers (students, companies, universities...)
 - compliance with needs
 - evaluation of the initiative as a whole
 - other elements deemed useful.



Furthermore, at the end of each training module, the manager draws up a report highlighting the defects found and the possible improvements to achieve, in subsequent editions of the same or similar activities, full compliance with the requirements of the "customer" (explicit requirements, implicit and binding).

The Quality Manager prepares the summary report of the results of the Questionnaires and sends them to the Manager for re-elaboration.

12. Evaluate the main benefits in implementing a QMS

The use of a Quality Management System is a key aspect of ensuring that products, services as well as internal processes meet the highest standards. Experts share six main benefits that come with adopting a modern quality management system.

- Improved products & services: A quality management system ensures that quality criteria are upheld across the full life cycle – from the development of products & services to client usage and post-purchase customer support.
- Increased productivity: Working with a state-of-the-art quality management system ensures that employees follow the latest guidelines set in place, which in turn benefits process efficiency and quality, and time management.
- Customer satisfaction: A properly designed and implemented quality management system builds on industry-leading client requirements and expectations, and as a result by embedding such best practices, companies can positively affect their client services.
- Improved processes: One side-benefit of quality management systems is that it stimulates businesses to continuously re-assess their processes and output. This exercise at the same time provides the opportunity to identify (other) areas of improvements, in turn enabling the creation of added value.
- Increased employee commitment: Quality management systems play an instrumental role in defining clear roles and responsibilities in the field of quality assurance. This transparency benefits the quality and the success of the business, while improving internal communications between the company's departments or teams.
- Better compliance: By implementing a quality management system, including documentation systems, companies can be guaranteed that their processes comply with (international) standards and regulations in a fast and simple way. Such systems





also provide the availability to run audits and reports, making it easier to monitor compliance and adapt where needed.

13. Analyze some problem-solving tools

Within the QSM it is important to raise awareness of continuous improvement, obtained through:

- the analysis of the collected data
- the implementation of the corrective and preventive actions decided upon
- the commitment to the quality of the service

At each review, the Management examines the results achieved, in terms of preestablished parameters and sets the new objectives, deciding and allocating the necessary resources.

Both the quality policy and the resulting indicators are updated with each review, adding new analyzes and eliminating those that are useless or outdated.

The learning center will also be used for the training of Quality Managers of Asian universities.





4. Conclusions

To sustain the use of the Learning Centers we defined, with all the partners of the project HEIs and SMEs, a sustainability assurance plan for their quality certification.

The objective is to obtain ISO 9001 quality certification in the medium term. To achieve this, the Learning Centers have been designed based on a process approach in order to be compatible with ISO certification.

Procedures have been defined for the main steps of the main processes:

- registration of trainees,
- evaluation of their maturity level,
- training programs proposal,
- evaluation of training programs
- ...

Based on this, the sustainability plan, described below, is designed towards the designated HEIs of the Partners Countries to ensure the continuation of this key activity beyond the end of the project.

The plan to perpetuate the use of the Learning Centers has been defined by each partner in order to sustain their use. These sustainability actions have been described in deliverables D2.1 to D2.4 (which describe the 4 pilots developed within the project).

The key issues to ensure the sustainability of the Learning Centers are:

- The assessment of the Learning Centers' services and learning materials
- The quality certification of the LC (IS09001 processes QMS)
- The definition of a Business/Economic model

This deliverable describes these key issues and the solutions/actions that the project and each partner has decided to implement.



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