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Erasmus+ Programme
of the European Union



Curriculum Development of Master's Degree Program in Industrial Engineering for Thailand Sustainable Smart Industry -MSIE4.0

REVISED WORKING PLAN WP1

Chiang Mai University | 31st May 2018



WP1

WP1 is aimed to provide comparative analysis of the actual situation concerning the MSc curricula in Industrial Engineering offered in Thai and EU partner countries universities, the identification of the gaps between the real needs of the industry, the student needs and the actual offered curricula. The recommendations for the new curriculum development, are the most important deliverable working elements for the first year of the project in WP1.

Throughout the entire first year the WP1 will

- 1) identify the strengths and weaknesses , the common points, the differences and the good practices concerning curricula, teaching methods and tools in Thai and EU universities
- 2) identify the gap between the needs of industry, for being ready for Thailand 4.0, especially in capacity building, and the competence of MSc graduates from current curricula offered by Thai and EU universities
- 3) recommend the specifications and focus areas of the new proposed MSIE curriculum.

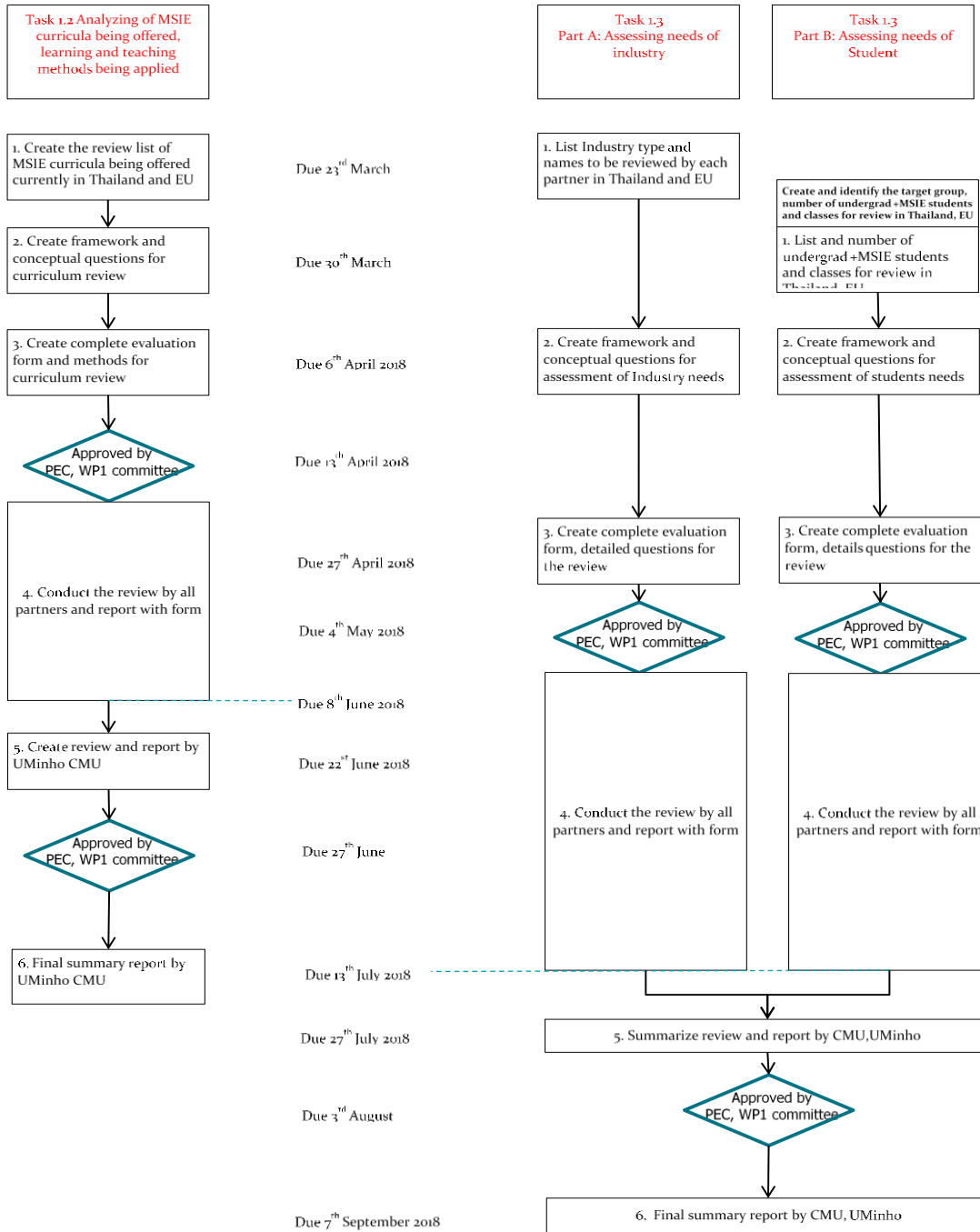
The WP1 will be led by CMU close collaboration with UMinho that will co-lead and be the WP1 coordinator for EU partners. All partners will also participate and be responsible for tasks related to their geographical regions.

This analysis working plan is now revised after the kick-off meeting and is being presented to the project executive committee-PEC for approval.



WP1-1.1 Developing a gap analysis working plan

This WP1 starts with the development of a gap analysis working plan which had been presented to the project executive committee-PEC for approval during the kick-off meeting. This is done by the WP1 leaders (CMU) and (UMinho) with the participation of the project coordinator and with the consultation of the other members of the consortium.

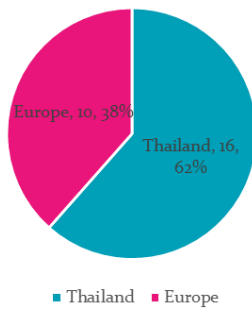


WP1-1.2 Analysing of MSIE curricula being offered, and of learning and teaching methods being applied

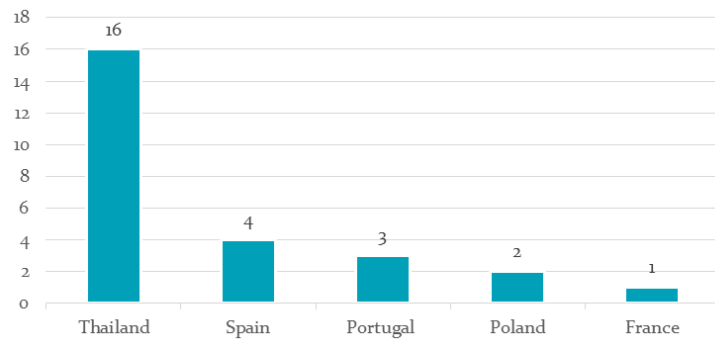


Comprehensive analysis of MSIE curricula along with the assessment of teaching and learning methods being offered in Thailand and partners countries is conducted during the first half of the first project's year, and will be presented to the project committee during the first regular meeting.

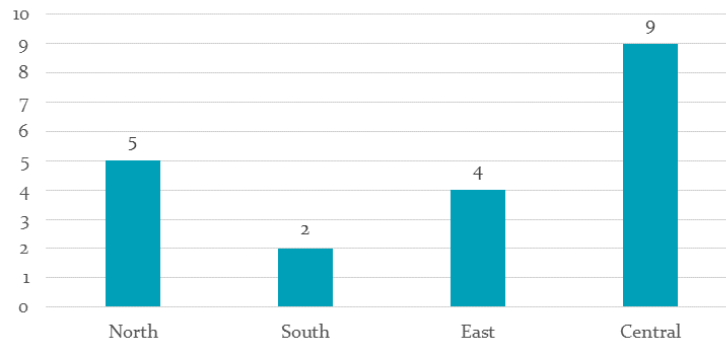
26 Universities selected for Curriculum review
classified by Region



26 Universities selected for curriculum
reviewed clasifed by Country



20 M.S. Programs reviewed in Thailand
classified by Region



The following are the list of curricula being reviewed by WP1.2 consisting of 20 programs of M.S. in Industrial Engineering and related from 16 universities in Thailand and 10 programs of M.S. in Industrial Engineering and related from 10 universities in Europe.

20 Programs from 16 Universities selected in Thailand listed by each partner

Chiang Mai University (CMU)	1. Chiang Mai University (CMU)	1. Master of Engineering Program in Industrial Engineering
	2. Naresuan University	1. Master of Engineering Program in Management Engineering
	3. Mae Fah Luang University	1. Master of Business Administration Programme in Logistics and Supply Chain Management (International Programme)
	4. Kasetsart University	1. Master degree in industrial engineering 2. Master degree in engineering management
Khon Kaen University (KKU)	1. Khon Kaen University (KKU)	1. Master of Engineering Program in Industrial Engineering
	2. Suranaree University of Technology	1. Master of Engineering (Industrial Systems and Environmental Engineering)
	3. Ubon Ratchathani University	1. Master of Engineering Program in Industrial Engineering
	4. Chulalongkorn university (CU)	1. Master of Industrial Engineering
Prince of Songkla University (PSU)	1. Prince of Songkla University (PSU)	1. Master of Engineering Program in Industrial Engineering
	2. King Mongkut's Institute of Technology Ladkrabang	1. Master of Industrial Engineering
	3. Burapha University	1. Master of Industrial Engineering
	4. Nakhon Si Thammarat Rajabhat University	1. Master of Industrial Engineering
King Mongkut's University of Technology North	1. King Mongkut's University of Technology North Bangkok	1. Master of Industrial Engineering
	2. King Mongkut's Institute of Technology Thonburi	1. Master of Engineering Program in Metal Forming Technology 2. Master of Engineering Program in Manufacturing System Engineering 3. Master of Engineering Program in Precision Engineering
Thammasat University (TU)	1. Thammasat University (TU)	1. Master of Industrial Engineering
	1. Sirindhorn International Institute of Technology (SIIT), Thammasat University	1. Master of Engineering Program in Engineering Technology 2. Master of Engineering Program in Information and Communication Technology for Embedded Systems (ICTES) 3. Master of Engineering Program in Logistics and Supply Chain Systems Engineering (LSCSE)



10 Programs being reviewed in Europe listed by each partner

UPB	1. Universitatea POLITEHNICA din Bucuresti/POLITEHNICA University of Bucharest (UPB)	1.Master of Engineering Programs in Industrial Engineering
		Design industrial și produse inovative/Industrial design and product innovation(DIPI)
		Inginerie avansată asistată de calculator/Advanced Computer Aided Engineering(IAAC)
		Ingineria nanostructurilor și proceselor neconvenționale/Engineering of nanostructures and nonconventional processes(INPN)
		Ingineria proiectării și fabricării produselor/Engineering of Design and Product Manufacturing(IPFP)
		Conception intégrée des systèmes technologiques/ Concepția integrată a sistemelor tehnologice/Integrated design of technological systems(CIST)
		Concepție si management în producția/Design and Management of Automated Production Systems(CMP)
		Echipamente pentru terapii de recuperare/Rehabilitation Therapies Equipments(ETR)
		Mașini și sisteme de producție/Machines and production systems(MSP)
		Tehnologii și sisteme poligrafice/Poligraphic systems and technologies(TSP)
		Logistică industrial/Industrial logistics(LI)
		Managementul întreprinderilor industriale virtuale/Management of virtual industrial enterprises(MIV)
		Ingineria calității/Quality Engineering(IC)
		Ingineria și managementul proceselor de sudare și control/Engineering and management of welding and control processes(IMPSC)
Ingineria securității și sănătății în muncă/Occupational safety and health engineering(ISSM)		
Evaluarea calității materialelor și produselor/Quality assessment of materials and products(ECMP)		

	2. Universidad Politécnica de Madrid	1.Master programe from ESCUELA TÉCNICA SUPERIOR DE INGENIEROS INDUSTRIALES(CFAC)
	3.Universitatea Tehnica Gheorghe Asachi, Iasi/Technical University Gheorghe Asachi, Iasi (U Gha Iasi)	1.Concepția și Fabricația Asistată de Calculator/Computer Assisted Design and Manufacturing(IMFM) 2.Inginerie și Management în Fabricația Mecanică/Engineering and Management in Mechanical Manufacturing
	4.ESCUELA TÉCNICA SUPERIOR DE INGENIEROS INDUSTRIALES - Universidad Politécnica de Madrid (UPM)	1.ESCUELA TÉCNICA SUPERIOR DE INGENIEROS INDUSTRIALES - Universidad Politécnica de Madrid
U Minho	1.University of Minho	1.UMinho1 - Integrated Master in Industrial Engineering and Management (MIEGI) 2.UMinho2 - Master in Engineering Systems (MES) 3.UMinho3 - Master in Industrial Engineering (MEI) – Industrial Management option
	2.University of Porto	1.U.Porto -Integrated Master in Industrial Engineering and Management (MIEGI)
	3.University of Aveiro	1.UA – Master in Industrial Engineering and Management (MEGI)
CUT	1.University: Częstochowa University of Technology, PL	1.Master Program in Management and Production Engineering
	2.University: AGH, Kraków, PL	1.MSc Program: Management and Production Engineering
	3.University: Grenoble INP, FR	1.Master in Sustainable Industrial Engineering

The task 1.2 aiming at analysing MSIE curricula being offered, and of learning and teaching methods being applied and will be carried out considering the following tasks:

- Task 1.2.1 Reviewing MSIE curricula being offered currently in Thailand ☑
- Task 1.2.2 Reviewing teaching and learning methods being applied currently in Thailand
- Task 1.2.3 Reviewing MSIE curricula being offered currently in partners' countries - Task 1.2.4. Reviewing teaching and learning methods being applied in partners' countries
- Task 1.2.5 Analysing curricula, and teaching and learning methods

The output of these tasks will contribute to an understanding about the MSIE curricula in Thailand and European countries, in order to create a ground base for the identification of the gap between competences' needs for Industry 4.0 and sustainability and the academic development of Industrial Engineering master students.

According to the literature, curriculum analysis is helpful to identify aspects that are working and those that need a change (Wolf, Hill & Evers, 2006). This purpose is crucial in the context of Industry 4.0 and Sustainability, in order to prepare future engineers to face



the challenges of their practice. Thus, the curriculum analysis is an essential step of this process.

It is possible to identify different approaches for curricula analysis in Higher Education (e.g. Fensham, 1977; Kirkpatrick 1998; Barnett, Parry, & Coate, 2001; Barnett & Coate, 2005; Cowan, 2006; Wolf, Hill & Evers, 2006; Wolf, 2007; Zabalza, 2009; Mesquita, 2015). These approaches include different components and processes such as: structure of the programme, educational experiences, program/ course/ class objectives, resources, learning environment, activities and strategies, course content, assessment, teacher role, institutional support, amongst other issues.

In the scope of this project, the diversity of institutions and programs to be analysed implies a definition of multiple sources and methods, as recommended by Wolf, Hill & Evers (2006). With this in mind, several types of information will be analysed in order to identify specific curricula elements, mainly concerning to the structure of the different programmes, type of educational experiences, areas of specialization, objectives / learning outcomes and innovative learning approaches with a student centred approach (i.e. active learning strategies). These elements are essentials to analyse the IE competences in the context of Industry 4.0 and Sustainability. .

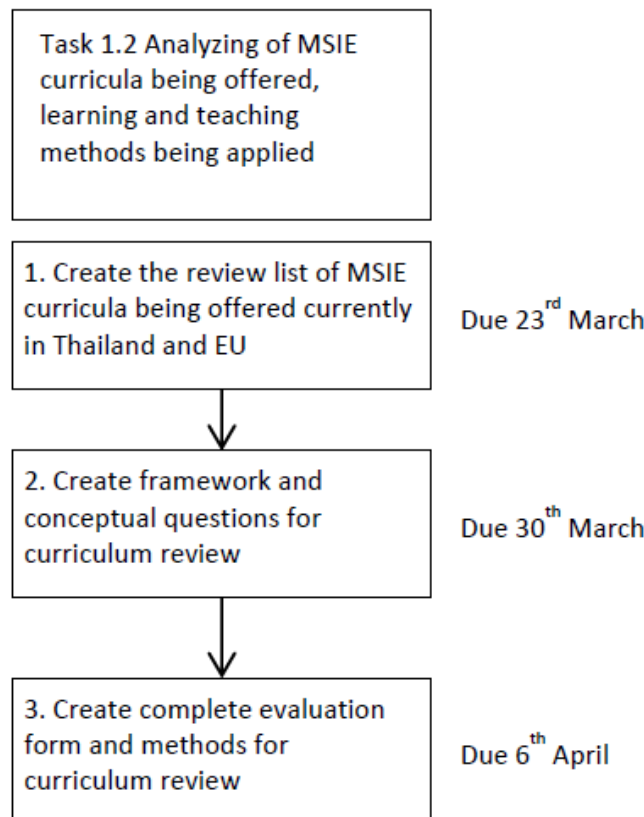


Figure 1: Steps 1-3 of Task 1.2 plan (from revision 3 made on 2018.03.23)

As planned in this task, there is the need to collect information about curriculum and about teaching and learning strategies. In the first phase the WP1 team should develop instruments for collecting information (Figure 1) until April, 6th

Figure 2 presents a schematic representation of the method that will be followed by the WP1 team, during the execution and analysis phases. Task 1.2 will collect data using forms and narratives and data will be analysed using qualitative and quantitative methods.

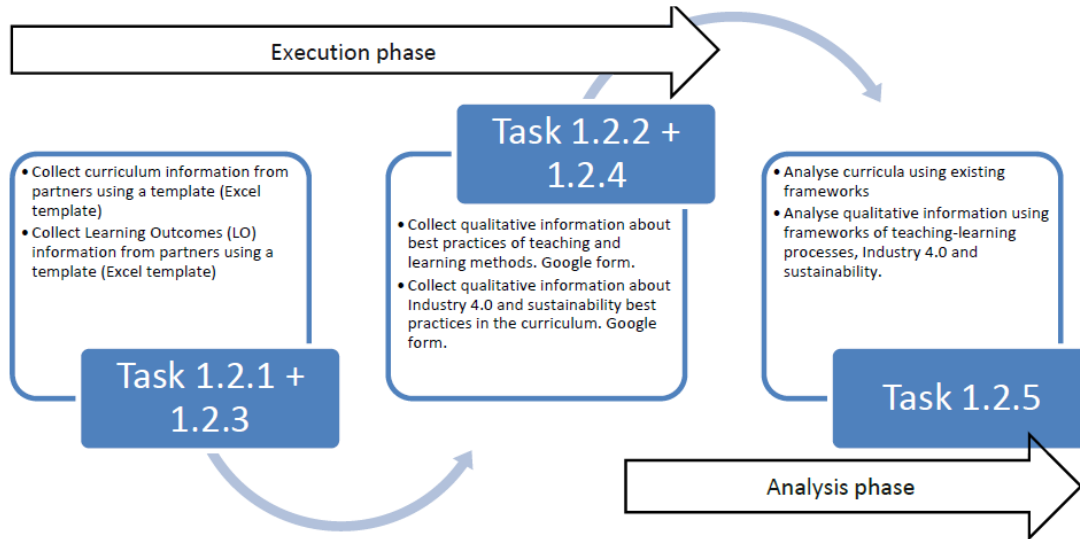


Figure 2: Execution and analysis phases of Task 1.2 methodology

An Excel template is developed and is already distributed among the partners to collect information about curriculum structure, areas of specialization and learning outcomes. A form is being developed to collect information about best - practices of type of educational experiences based on innovative learning environments with a student centred approach (i.e. active learning strategies). Reviewing MSIE curricula (tasks 1.2.1 and 1.2.3) will be based on data collected from partners, using an Excel file as a template. First, we collect information from the courses, class types, hours of contact, credits and number of enrolled students. Please check next figure as an example

YEAR	SEM	CODE	COURSE	C/E	General Scientific Area	T	IP	PL	OT	Credits	Hours (w/...)
4	7	UMI_47_1	Ergonomic Workplace Analysis	C	IEM	2	2			5	4
4	7	UMI_47_2	Integrated Production Management	C	IEM	2		2		5	4
4	7	UMI_47_3	Integrated Project in Industrial Engineering and Management II	C	IEM	2		1		5	3
4	7	UMI_47_4	Production Information Systems	C	IEM	2	1			5	3
4	7	UMI_47_5	Production Systems Organization II	C	IEM	2		1		5	3
4	7	UMI_47_6	Simulation	C	IEM				5	5	5
4	8	UMI_48_1	Advanced Quality Engineering and Management	C	IEM	2		1		5	3
4	8	UMI_48_2	Computer Aided Design and Computer Aided Process Planning - CAD/CAPP	C	IEM	2		1		5	3
4	8	UMI_48_3	Computer Aided Manufacturing	C	IEM	2	1			5	3
4	8	UMI_48_4	Integrated Project in Industrial Engineering and Management III	C	Complementary Sciences	2	1			5	3
4	8	UMI_48_5	Reliability and Industrial Maintenance	C	IEM	1	2			5	3
4	8	UMI_48_6	Sociology e Law of Organizations	C	IEM				5	5	5
5	9	UMI_59_1	Research Methods	C	Complementary Sciences	1	2			5	3
5	9	UMI_59_2	Option V - Lean Enterprise	E	IEM	2	1			5	3
5	9	UMI_59_3	Option VI - Design of Product Oriented Production Systems	E	IEM	2	1			5	3
5	9	UMI_59_4	Option VII - Lean Teams and Project Management	E	IEM	2	1			5	3
5	A	UMI_59_5	Master Thesis in Industrial Engineering and Management	C	IEM					0.5	40

In a second sheet, we ask information from learning outcomes in order to identify the expected competences to be developed by the graduates. Please add 4 to 6 LOs by course.

YEAR	SEM	CODE	COURSE	C/E	LO CODE	LO
4	7	UMI_47_2	Integrated Production Management	C	UMI_47_2_1	Identify the requirements for implementing the functions of Integrated Production Management (IPM).
4	7	UMI_47_2	Integrated Production Management	C	UMI_47_2_2	Discuss the implications of different methods and functions of Production management.
4	7	UMI_47_2	Integrated Production Management	C	UMI_47_2_3	Relate and integrate organizational processes and techniques of Integrated Production Management.
4	7	UMI_47_2	Integrated Production Management	C	UMI_47_2_4	Identify, describe and analyze processes of Integrated Production Management.
4	7	UMI_47_2	Integrated Production Management	C	UMI_47_2_5	Write reports and undertake oral presentations
4	7	UMI_47_2	Integrated Production Management	C	UMI_47_2_6	Develop competences of communication in a foreign language
4	7	UMI_47_3	Integrated Project in Industrial Engineering and Management II	C	UMI_47_3_1	Plan, develop and manage an interdisciplinary team project.
4	7	UMI_47_3	Integrated Project in Industrial Engineering and Management II	C	UMI_47_3_2	Apply the contents of the courses in the context of the project.
4	7	UMI_47_3	Integrated Project in Industrial Engineering and Management II	C	UMI_47_3_3	Evaluate the project proposal considering predefined criteria.
4	7	UMI_47_3	Integrated Project in Industrial Engineering and Management II	C	UMI_47_3_4	Write reports and undertake oral presentations
4	7	UMI_47_3	Integrated Project in Industrial Engineering and Management II	C	UMI_47_3_5	Learn how to work as a member of a team and independently
4	7	UMI_47_3	Integrated Project in Industrial Engineering and Management II	C	UMI_47_3_6	

The collection of data about best practices on learning methods, industry 4.0 and sustainability (tasks 1.2.2 and 1.2.4) will be done in a qualitative way, asking partners to fill a form for each best practice. These best practices can be related to student centred learning strategies (active learning), Industry 4.0 or sustainability. We expect that each project partner can fill in at least two best practices by teaching-learning strategies and two by I4.0 and sustainability. This means 4 entries by project partner. Finally, the data will be analysed using a mixed approach between a quantitative approach (descriptive statistics) and qualitative data analysis procedures. A final report will be developed.

We will classify (Task 1.2.5 - first) these courses using the following IEM areas of knowledge (Lima, Mesquita, Amorim, Jonker, & Flores, 2012; Mesquita, Lima, Flores, Marinho-Araujo, & Rabelo, 2015):

1. Production Management (including Production System Design)



- | | |
|-------------------------------------|---------------------------------|
| 2. Automation | 3. Quality |
| 4. Economics Engineering | 5. Operations Research |
| 6. Computer and Information Systems | 7. Ergonomics and Human Factors |
| 8. Logistics | 9. Maintenance |
| 10. Project Management | 11. Sustainability |
| 12. Product Design | 13. Simulation |

In a second worksheet, we will collect information from learning outcomes, and will classify and analyse (Task 1.2.5 - first) them using a framework of competences based on Mesquita et al. (2015) and Prifti, Knigge, Kienegger, and Krcmar (2017). This classification will be done by two researchers and reviewed by a third researcher.

Finally, a report will be developed summarizing all the information collected and analysis developed.



WP1-1.3: Assessing needs of industry and student

The comprehensive analysis of needs of industry and students (all partners will conduct a survey with companies assigned in their regions in the list and with the help of the Associated Partners. They will also conduct survey with prospective students in their regions. The outcome of this activity will be classified as following

- Task 1.3.1 Preparing a survey form for identifying the needs of industry for MSIE graduates to support their success in Thailand 4.0 and Industry 4.0
- Task 1.3.2 Preparing a survey form for the needs of prospective students for preparing them for Thailand 4.0 and Industry 4.0
- Task 1.3.3 Conducting survey for companies and organizations in the list
- Task 1.3.4 Conducting survey from students
- Task 1.3.5 Identifying the needs of industry and students

The finding of statistics for SME company in Thailand shows that there are more than 30,000 SME. By assuming that the high impact SME in Thailand is at least 1,000, the sampling table of YAMANE indicates that the minimum of 91 companies shall be listed based on the 10% error.

The The WP1 leader searches for the first and the new S-curves or new country competitive. The TL researcher decided to focus on only 4 groups of (First S-curve)

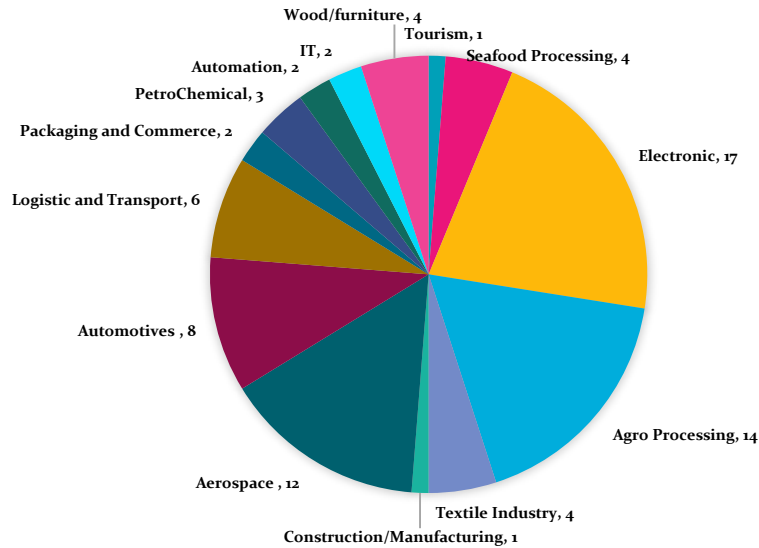
- 1) Next – Generation Automotive
- 2) Smart Electronics
- 3) Agriculture and Biotechnology
- 4) Food for the Future.

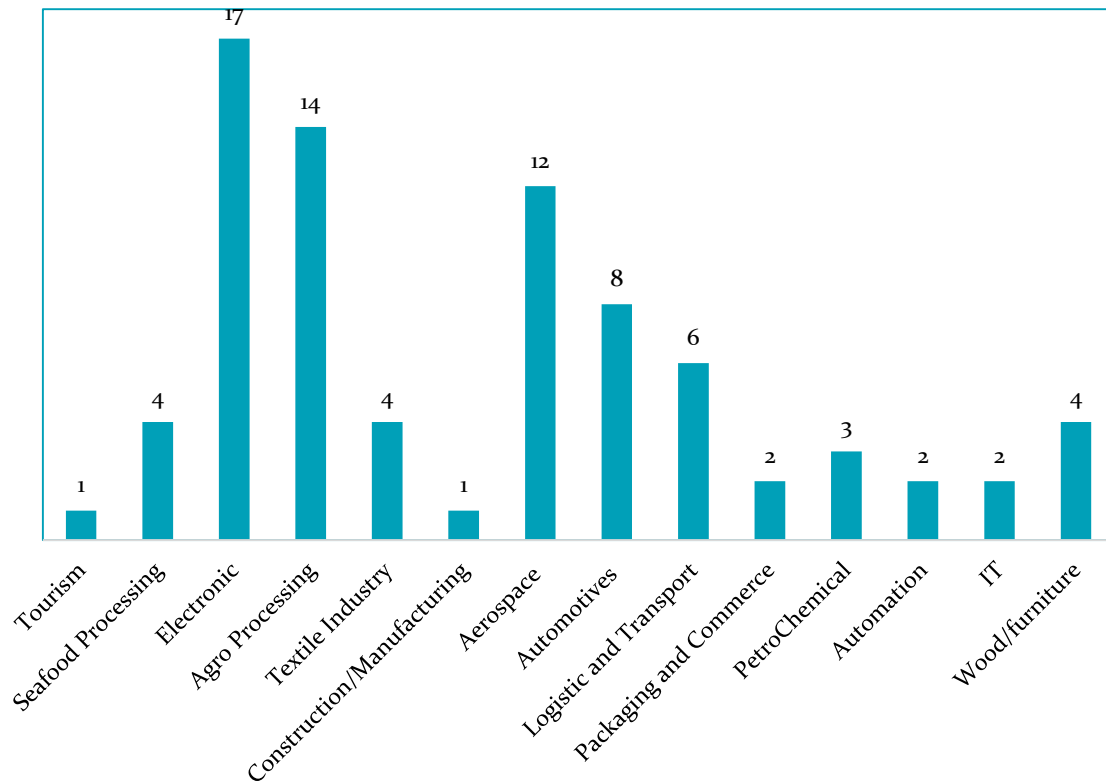
These classification the first S-curve in Thailand was consulted with CWPL and all partners. The specific names of the companies for all study group in Thailand were created and given to all partners for approval. The total of 80 companies are listed by the following clusters:

Tourism	Seafood Processing	Electronic
Agro Processing	Textile Industry	Construction/Manufacturing
Aerospace	Automotives	Logistic and Transport
Packaging and Commerce	PetroChemical	Automation
IT	Wood/furniture	



80 COMPANIES SELECTED FOR NEED ASSESSMENT CLASSIFIED BY INDUSTRY SECTOR





The TL has adopted, modified the questionnaires from the “Industry 4.0 Readiness” study was commissioned by the IMPULS Foundation of the German Engineering Federation (VDMA) and conducted by IW Consult (a subsidiary of the Cologne Institute for Economic Research) and the Institute for Industrial Management (FIR) at RWTH Aachen University.

This questionnaires has 23 pages consists of 3 parts

1. Definitions of Industry 4.0, Industry 4.0 Adoption Scope and Readiness Scheme (p 1-4)

2. Business Background (p 5)

3. Part 1: Industry 4.0 Adoption Scope (page 6-11)

- 1. Business strategy, Business Models, Product & Service Portfolio
- 2. Transversal & Domain related Competences:Employee

4. Part 2 : Industry 4.0 Readiness Scheme (page 12-23)

1. Smart products & Co-created Design:

-To what extent can your products be controlled with IT, making it possible for them to communicate and interact with higher-level systems along the value chain?

2. Smart factory (Intelligence Manufacturing System):



-To what extent does your company have digitally integrated and automated production based on cyber-physical systems?

3. Smart operations (Controlling, Adjusting & Monitoring Process Real Time):

-To what extent are the processes and products in your company digitally modeled and capable of being controlled through ICT systems and algorithms in a virtual world?

4. Data driven services (Integrated Business&Operational Data Management):

-To what extent do you offer data-driven services that are possible only through the integration of products, production, and customers?

The following are the list of company selected for reviewed. (*Not completed by TU, AIT*)



University	Cluster	Company
Chiang Mai University (CMU)	Wood Processing	Suksawad
	Seafood Processing	CP group
	Electronic	Hana Microelectronics Public Co., Ltd. (Lamphun)
		Murata Electronics (Thailand) Ltd.
		Fujikura Electronics(Ltd) Thailand
	Agro Processing	Betagro Agro Industry Co.,Ltd
		Northern Food Company Limited
		Pepsi-Cola Thai Trading Co.,Ltd.
	Textile Industry	Performance Manufacturing (Thailand) Ltd.
		Pattaya Lamphun Co., Ltd.
		Onsmooth Thai Co.,Ltd.
	Aerospace	Zodiac AirCatering Equipment (Thailand) Ltd.
	Automotives	Keihin (Thailand) Co., Ltd.
		Toyota Thailand
	Logistic and Transport IT	Logistics of 7/11 Thailand Datamars (Thailand) Ltd.
Prince of Songkla University (PSU)	Wood Processing	APK Furnishing Parawood Xunthai Parawood SWP Parawood Panel Plus
	Rubber Processing	Rubber Processing Michelin Sritrang Agro Industry Siam Sempermed
	Tourism	PKCD
	Seafood Processing	MANA KIANG HUAT SEA GULL TRADING FROZEN FOOD PUBLIC Co., Ltd.
		Chotiwat Manufacturing Co.,Ltd.



Khon Kaen University (KKU)	Electronic	Panasonic Electric Works (Khon Kaen) Co.,LTD Seagate Technology (Thailand) Ltd.	
	Agro Processing	Kalasin Mit Sugar Co.,Ltd Mondelez (Thailand) Co.,Ltd CP Ram (Khon Kaen)	
	Textile Industry	NK Apparel Co., Ltd.	
	Logistic and Transport	Thai Beverage Logistics Co., Ltd. Cho Thavee Public Co., Ltd.	
	Packaging and Commerce	Thai Containers Khonkaen Co., Ltd. Siam Global House Plc. (Khon Kaen)	
	Electronic	Ronda Thailand Daikin Industries (Thailand) LTD. Samsung Thailand (Thailand) LTD. TOSHIBA THAILAND (Thailand) LTD.	
	Automotives	Komatsu Seiki (Thailand) Co., Ltd. Ford Thailand Nissan Motor (Thailand) Co., Ltd.	
	Logistic and Transport	DHL(Thailand) Co., Ltd. Grand Home Mart.Co., Ltd. DKSH (Thailand) Co., Ltd	
AIT	Electronic	SVI WD	
	****Total of at least 4 Companies are requested to specified more	Incomplete	
UPB	Electronic	MicroElectronica Voluntari Felix Electronic Services Bucharest Benchmark Romania	
	Aerospace	TurboMecanica Bucharest Unison Engine Components Bucharest – General Electric Aviation Avioane Craiova	
	Automotives	Group Renault Romania Ford - Craiova Engine Plant Pirelli Romania	



	PetroChemical	Cameron Romania	
		UPetrom 1 Mai Ploiesti	
		UPet Targoviste	
CUT	Electronic	Whirlpool	
		Electrolux (Sosnowiec)	
		Bosch und Siemens (BSH)	
	Aerospace	Wielton	
		ZF/TRW	
		Linex	
Thammasat University (TU)	Construction/Manufacturing	Kohler (Thailand) Public Co., Ltd.	
	****Total of 9 Companies are needed to specified more	Incompleted !	
UMinho	Aerospace	Bosch Car-Multimedia systems	
		Continental ITA	
		Leoni	
		Continental Mabor	
		PREH	
		Critical	
		ITEC	
		IT	Primavera

NOTE:

1. For Thammasat University (TU), Total of 9 Companies are needed to specified. The list provided by TU is incomplete
2. For AIT, Total of 4 Companies are requested to be specified.



University	Cluster													Region of Thailand		
	Tourism	Seaford Processing	Electronic	Agro Processing	Textile Industry	Construction/Manufacturing	Aerospace	Automotives	Logistic and Transport	Packaging and Commerce	Petro-Chemical	Automation	IT		Wood/Furniture	
Chiang Mai University (CMU)		CP group	Hana Microelectronics Public Co., Ltd. (Lampoon)	Betsagro Agro Industry Co., Ltd.	Performance Manufacturing (Thailand) Ltd.		Zodia: AirCatering Equipment (Thailand) Ltd.	Kohin (Thailand) Co., Ltd.	Logistics of 7/11 Thailand				Datamar	Sakswad	North	
			Morata Electronics (Thailand) Ltd.	Northern Food Company Limited	Pattaya Lamphu Co., Ltd.			Toyota Thailand								
			Fujikura Electronic Ltd. Thailand	Pepsi-Cola Thai Trading Co., Ltd.	Omnimoth Thai Co., Ltd.											
Khon Kaen University (KKU)			Panasonic Electric Works (Khon Kaen) Co., LTD.	Kulain Mi Sugar Co., Ltd.	NK Apparel Co., Ltd.				Thai Beverage Logistics Co., Ltd.	Thai Containers Khonkaen Co., Ltd.					The North East	
			Sageat Technology (Thailand) Ltd.	Mondelez (Thailand) Co., Ltd.					Cho Thavee Public Co., Ltd.	Sun Global House Plc. (Khon Kaen)						
				CP Ram (Khon Kaen)												
King Mongkut's University of Technology North			Ronda Thailand					Komatsu Saki (Thailand) Co., Ltd.	DHL (Thailand) Co., Ltd.						East	
			Dakin Industries (Thailand) LTD.					Ford Thailand	Grand Home Mart Co., Ltd.							
			Samsung Thailand (Thailand) LTD.					Nissan Motor (Thailand) Co., Ltd.	DKSH (Thailand) Co., Ltd.							
			TOSHIBA THAILAND (Thailand) LTD.													
Prince of Songkhla University (PSU)	PKCD	MANA		APK Furnishing Parawood											Southern	
		KIANGHUAAT SEA GULL TRADING Chonwa Manufacturing Co., Ltd.		Xunhai Parawood												
				SWP Parawood												
				Panel Plus												
				Rubber Processing												
				Michelin												
				Srirang Agro Industry												
Thammasat University (TU)						Kobler (Thailand) Public Co., Ltd.										
AIT			SVI													
			WD													
UTB			MicroElectronica Voluntari				TurboMechanica Bucharest	Group Renault Romania					Camoron Romania			
			Felix Electronic Services Bucharest				Union Engine Components Bucharest - General	Ford - Craiova Engine Plant					UPetrom 1 Mai Ploiesti			
			Benchmark Romania				Avioane Craiova	Pirelli Romania					UPet Targoviste			
UMinho							Bosch Car-Multimedia systems					Critical	Primavera			
							Continental ITA					ITEC				
							Leoni									
							Continental Mabor									
CUT			Whirlpool				Wielton								Waldli	
			Electrolux (Sosnowiec)				ZF/TRW								MIRIAN	
			Bosch and Siemens (BSI)				Linex								KLER	



WP1-1.4: Identifying gaps

Regarding comprehensive analysis of needs of industry and students (WP1-1.3), all partners will also conduct survey with prospective students in their regions. The outcome of this activity will be available at the end of M9 for gap analysis (WP1-1.4), for identifying competitive factors for the curriculum (WP1-1.5).

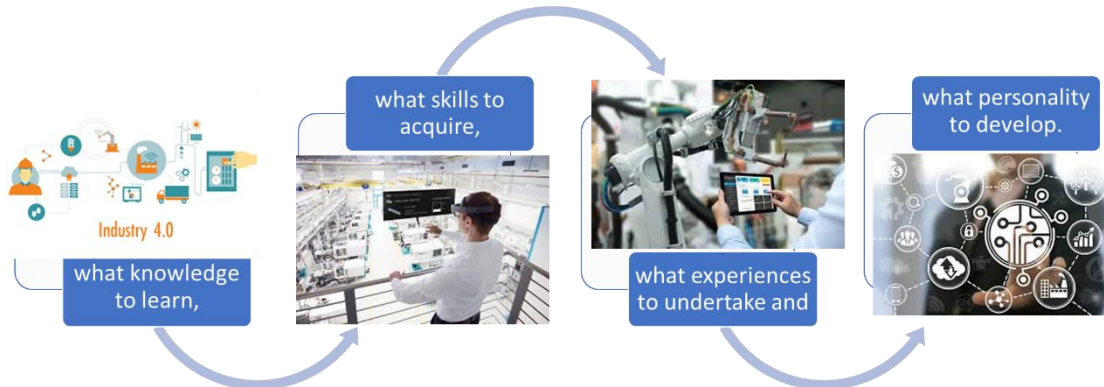
- Task 1.4.1 Comparing the needs of industries in Thailand and European partners' countries
- Task 1.4.2 Identifying gaps between the needs of industry and the competence of MSIE graduates

Based on the questionnaires derived in WP1-1.3, the identifying gaps will be based on the questionnaires consists of 4 parts

1. What knowledge to learn?
2. What skill to acquire?
3. What experience to undertake?
4. What personally to develop?

Based on those collected WP1-1.4 questionnaires, the analysis will be combined with the WP1-1.3 questionnaires using the Quality Function Deployment(QFD) to

- 1st define the competency + professional practice: interviews (exploratory) and questionnaire
- 2nd look at the boundary, key players who are going to use IE in Thailand
- 3rd use QFD with those key players to identify their needs (not only IE but the needs for business competitiveness)



WP1-1.5: Identifying competitive factors for the curriculum

An analysis of gaps between the actual competence of MSc graduates in Industrial Engineering and the real needs of industry for Thailand 4.0 and Industry 4.0 and in EU countries referring to Europe 2020 goals will be made and presented in a form of a report and it will be a part of the second WP1 progress report.

WP1-1.6: Developing recommendations for the specifications and areas of specialization for the curriculum

Based on a wide analyse of the target group needs, the identified gaps and on world trends and developments in the Industrial Engineering, the factors that will provide competitive advantage to the curriculum will be identified and presented in a form of a report which will be a part of the second WP1 progress report.

WP 1 deliverables

1. The comparative analysis of the actual situation concerning the MSc curricula in Industrial Engineering offered in Thai and EU partner countries universities,
2. The identification of the gaps between the real needs of the industry,
3. The student needs and the actual offered curricula,
4. The recommendations for the new curriculum development,
5. The most important working elements for the first year of the project in WP1.

The WP1 will be led by CMU in close collaboration with UMinho that will co-lead and be the WP1 coordinator for EU partners. All partners will also participate and be responsible for tasks related to their geographical regions.



WORKPLAN for project year 1

Ref.nr/ Sub-ref nr	Activities Title	Total duration (number of weeks)	Months													
			M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12		
Task 1.1	Develop a gap analysis work plan	3	3=,3X													
Task 1.2	Analyzing of MSIE curricula being offered, and of learning and teaching methods being applied	10		2=,2x	2=,2x	2=,2x	2=,2x	2=,2x								
Task 1.3	Assessing needs of industry and students	10					2=,2x	2=,2x	2=,2x	2=,2x	2=,2x					
Task 1.4	Identifying gaps	3									=,x	2=,2x				
Task 1.5	Identifying competitive factors for the curriculum	3										2=,2x		=,x		
Task 1.6	Developing recommendations for the specifications and areas of specialization for the curriculum	4												2=,2x	2=,2x	
Task 3.3	Developing a web-portal for online learning	12						2=,2x	2=,2x	2=,2x	2=,2x	2=,2x	2=,2x	2=,2x		
Task 4.1	Developing a quality control and monitoring system	7	2=,2x	2=,2x	2=,2x	=,x										
Task 4.2	Implementing the internal quality control and monitoring of the project	5				=,x		=,x		=,x		=,x		=,x		=,x
Task 5.1	Development of a Dissemination, Exploitation and Sustainable plan,	6	2=,2x	2=,2x	2=,2x											
Task 5.2	Creating a project website and maintaining it throughout the project lifetime to support the dissemination strategy, and communication and collaboration among partners,	14	=,2x	=,2x	x	x	x	x	x	x	x	x	x	x	x	x
Task 5.3	Production and dissemination of project materials,	6						=,2x	=,2x							=,2x
Task 5.6	Organizing dissemination events with relevant stakeholders	2														=,2x
Task 6.1	Finalizing management structure	3	3=,3x													
Task 6.2	Organizing kick-off and regular consortium meetings	6	2=,2x					2=,2x								2=,2x
Task 6.3	Monitoring and controlling the project	12	x	x	x	x	x	x	x	x	x	x	x	x	x	x

CMU : TL

Task 1.1 Developing a gap analysis working plan

- Task 1.1.1 Forming a working group for WP1
- Task 1.1.2 Creating a list of curricula to be reviewed
- Task 1.1.3 Setting up criteria for evaluation
- Task 1.1.4 Creating a list of companies and organizations for survey
- Task 1.1.5 Preparing an execution plan

UMinho : TL

Task 1.2 Analysing of MSIE curricula being offered, and of learning and teaching methods being applied

- Task 1.2.1 Reviewing MSIE curricula being offered currently in Thailand
- Task 1.2.2 Reviewing teaching and learning methods being applied currently in Thailand
- Task 1.2.3 Reviewing MSIE curricula being offered currently in partners' countries
- Task 1.2.4. Reviewing teaching and learning methods being applied in partners' countries
- Task 1.2.5 Analysing curricula, and teaching and learning methods

CMU : TL

Task 1.3 Assessing needs of industry and students

- Task 1.3.1 Preparing a survey form for identifying the needs of industry for MSIE graduates to support their success in Thailand 4.0 and Industry 4.0
- Task 1.3.2 Preparing a survey form for the needs of prospective students for preparing them for Thailand 4.0 and Industry 4.0
- Task 1.3.3 Conducting survey for companies and organizations in the list
- Task 1.3.4 Conducting survey from students
- Task 1.3.5 Identifying the needs of industry and students

UMinho : TL

Task 1.4 Identifying gaps

- Task 1.4.1 Comparing the needs of industries in Thailand and European partners' countries
- Task 1.4.2 Identifying gaps between the needs of industry and the competence of MSIE graduates

CMU : TL

Task 1.5 Identifying competitive factors for the curriculum

Task 1.6 Developing recommendations for the specifications and areas of specialization for the curriculum



Deliverables/results/outcomes

CMU : TL

Task 1.1 Developing a gap analysis working plan

- Task 1.1.1 Forming a working group for WP1
- Task 1.1.2 Creating a list of curricula to be reviewed
- Task 1.1.3 Setting up criteria for evaluation
- Task 1.1.4 Creating a list of companies and organizations for survey
- Task 1.1.5 Preparing an execution plan

Expected Deliverable/Results/Outcomes	Work Package and Outcome ref.nr	1.1.	
	Title	Gap Analysis working plan	
	Type	<input type="checkbox"/> Teaching material <input type="checkbox"/> Learning material <input type="checkbox"/> Training material	<input type="checkbox"/> Event <input checked="" type="checkbox"/> Report <input type="checkbox"/> Service/Product
	Description	A working plan containing: a) A list with WP1 working group members and responsibilities among the project partners , a list with companies , organizations , student associations and other stakeholders who will be the involved in the survey. b) Specific MSc curricula in MIE to be reviewed in Thailand and in EU partners' countries c) Criteria for evaluation d) templates and documents for the analyses e) Procedures and rules for the analyze process and for the control and quality assurance of the results f) Planning of the Gap Analysis activities.	
	Due date	M1	
Languages	English		
Target groups	<input checked="" type="checkbox"/> Teaching staff <input type="checkbox"/> Students <input type="checkbox"/> Trainees <input type="checkbox"/> Administrative staff <input type="checkbox"/> Technical staff <input type="checkbox"/> Librarians <input type="checkbox"/> Other If you selected 'Other', please identify these target groups. (Max. 250 characters)		
Dissemination level	<input type="checkbox"/> Department / Faculty <input checked="" type="checkbox"/> Institution	<input checked="" type="checkbox"/> Local <input type="checkbox"/> Regional	<input checked="" type="checkbox"/> National <input checked="" type="checkbox"/> International

Deliverables/results/outcomes

UMinho : TL

Task 1.2 Analysing of MSIE curricula being offered, and of learning and teaching methods being applied

- Task 1.2.1 Reviewing MSIE curricula being offered currently in Thailand
- Task 1.2.2 Reviewing teaching and learning methods being applied currently in Thailand
- Task 1.2.3 Reviewing MSIE curricula being offered currently in partners' countries
- Task 1.2.4 Reviewing teaching and learning methods being applied in partners' countries
- Task 1.2.5 Analysing curricula, and teaching and learning methods

Expected Deliverable/Results/Outcomes	Work Package and Outcome ref.nr	1.2.	
	Title	Comprehensive analysis of MSIE curricula being offered in Thailand and in EU partner countries	
	Type	<input type="checkbox"/> Teaching material <input type="checkbox"/> Learning material <input type="checkbox"/> Training material	<input type="checkbox"/> Event <input checked="" type="checkbox"/> Report <input type="checkbox"/> Service/Product
	Description	A comprehensive analysis of MSIE curricula being offered currently in Thailand and EU partners' countries will be made. This report in a form of a SWOT analyse will identify the strengths and weaknesses in Thai and EU universities , the common points, but also the differences The aim of this outcome is to identify the main good practices and aspects in the EU and Thai universities curricula's in order to be included in the new foreseen curricula. The report will emphasis on the This report will be a part of the first WP1 progress report presented at the second PEC meeting.	
	Due date	M6	
Languages	English, Thai		
Target groups	<input checked="" type="checkbox"/> Teaching staff <input type="checkbox"/> Students <input type="checkbox"/> Trainees <input type="checkbox"/> Administrative staff <input type="checkbox"/> Technical staff <input type="checkbox"/> Librarians <input type="checkbox"/> Other If you selected 'Other', please identify these target groups. (Max. 250 characters)		
Dissemination level	<input type="checkbox"/> Department / Faculty <input checked="" type="checkbox"/> Institution	<input checked="" type="checkbox"/> Local <input type="checkbox"/> Regional	<input checked="" type="checkbox"/> National <input checked="" type="checkbox"/> International



Deliverables/results/outcomes

CMU : TL

Task 1.3 Assessing needs of industry and students

- Task 1.3.1 Preparing a survey form for identifying the needs of industry for MSIE graduates to support their success in Thailand 4.0 and Industry 4.0
- Task 1.3.2 Preparing a survey form for the needs of prospective students for preparing them for Thailand 4.0 and Industry 4.0
- Task 1.3.3 Conducting survey for companies and organizations in the list
- Task 1.3.4 Conducting survey from students
- Task 1.3.5 Identifying the needs of industry and students

Expected Deliverable/Results/Outcomes	Work Package and Outcome ref.nr	1.3.	
	Title	Assessment of learning and teaching tools and methods in Thailand and in EU partner countries	
	Type	<input type="checkbox"/> Teaching material <input type="checkbox"/> Learning material <input type="checkbox"/> Training material	<input type="checkbox"/> Event <input checked="" type="checkbox"/> Report <input type="checkbox"/> Service/Product
	Description	Following the same analyse schema a comprehensive analysis of teaching and learning methods being applied currently in Thailand and EU partners' countries, in a form of a report , will be achieved with the same target groups and it will be a part of the first WP1 progress report.	
	Due date	M6	
Languages		English, Thai	
Target groups	<input checked="" type="checkbox"/> Teaching staff <input type="checkbox"/> Students <input type="checkbox"/> Trainees <input type="checkbox"/> Administrative staff <input type="checkbox"/> Technical staff <input type="checkbox"/> Librarians <input type="checkbox"/> Other		
	If you selected 'Other', please identify these target groups. (Max. 250 characters)		
Dissemination level	<input type="checkbox"/> Department / Faculty <input checked="" type="checkbox"/> Institution		<input checked="" type="checkbox"/> Local <input type="checkbox"/> Regional <input checked="" type="checkbox"/> National <input checked="" type="checkbox"/> International

Deliverables/results/outcomes

UMinho : TL

Task 1.4 Identifying gaps

- Task 1.4.1 Comparing the needs of industries in Thailand and European partners' countries
- Task 1.4.2 Identifying gaps between the needs of industry and the competence of MSIE graduates

Expected Deliverable/Results/Outcomes	Work Package and Outcome ref.nr	1.4.	
	Title	Analysis of needs of industry and students	
	Type	<input type="checkbox"/> Teaching material <input type="checkbox"/> Learning material <input type="checkbox"/> Training material	<input type="checkbox"/> Event <input checked="" type="checkbox"/> Report <input type="checkbox"/> Service/Product
	Description	A comprehensive analysis of the needs of industry for MSIE graduates to support their success in Thailand 4.0 and Industry 4.0 and of the needs of students for preparing them for Thailand 4.0 and Industry 4.0. Also concerning the EU industry and student needs, in a form of a report, will be achieved and it will be a part of the second WP1 progress report.	
	Due date	M9	
Languages		English, Thai	
Target groups	<input checked="" type="checkbox"/> Teaching staff <input type="checkbox"/> Students <input type="checkbox"/> Trainees <input type="checkbox"/> Administrative staff <input type="checkbox"/> Technical staff <input type="checkbox"/> Librarians <input type="checkbox"/> Other		
	If you selected 'Other', please identify these target groups. (Max. 250 characters)		
Dissemination level	<input type="checkbox"/> Department / Faculty <input checked="" type="checkbox"/> Institution		<input checked="" type="checkbox"/> Local <input type="checkbox"/> Regional <input checked="" type="checkbox"/> National <input checked="" type="checkbox"/> International



Deliverables/results/outcomes

Task 1.5 Identifying competitive factors for the curriculum

CMU : TL

Expected Deliverable/Results/Outcomes	Work Package and Outcome ref.nr	1.5.		
	Title	Gaps between the needs and graduates' competences		
	Type	<input type="checkbox"/> Teaching material <input type="checkbox"/> Learning material <input type="checkbox"/> Training material	<input type="checkbox"/> Event <input checked="" type="checkbox"/> Report <input type="checkbox"/> Service/Product	
	Description	An analysis of gaps between the actual competence of MSc graduates in Industrial Engineering and the real needs of industry for Thailand 4.0 and Industry 4.0 and in EU countries referring to Europe 2020 goals will be made and presented in a form of a report and t will be a part of the second WP1 progress report.		
	Due date	M10		
Languages		English, Thai		
Target groups	<input checked="" type="checkbox"/> Teaching staff <input type="checkbox"/> Students <input type="checkbox"/> Trainees <input type="checkbox"/> Administrative staff <input type="checkbox"/> Technical staff <input type="checkbox"/> Librarians <input type="checkbox"/> Other			
	If you selected 'Other', please identify these target groups. (Max. 250 characters)			
Dissemination level	<input type="checkbox"/> Department / Faculty <input checked="" type="checkbox"/> Institution		<input checked="" type="checkbox"/> Local <input type="checkbox"/> Regional	<input checked="" type="checkbox"/> National <input checked="" type="checkbox"/> International

Deliverables/results/outcomes

Task 1.6 Developing recommendations for the specifications and areas of specialization for the curriculum

CMU : TL

Expected Deliverable/Results/Outcomes	Work Package and Outcome ref.nr	1.6.		
	Title	Competitive factors for the curriculum		
	Type	<input type="checkbox"/> Teaching material <input type="checkbox"/> Learning material <input type="checkbox"/> Training material	<input type="checkbox"/> Event <input checked="" type="checkbox"/> Report <input type="checkbox"/> Service/Product	
	Description	Based on a wide analyse of the target group needs, the identified gaps and on world trends and developments in the Industrial Engineering, the factors that will provide competitive advantage to the curriculum will be identified and presented in a form of a report who will be a part of the second WP1 progress report.		
	Due date	M11		
Languages		English, Thai		
Target groups	<input checked="" type="checkbox"/> Teaching staff <input type="checkbox"/> Students <input type="checkbox"/> Trainees <input type="checkbox"/> Administrative staff <input type="checkbox"/> Technical staff <input type="checkbox"/> Librarians <input type="checkbox"/> Other			
	If you selected 'Other', please identify these target groups. (Max. 250 characters)			
Dissemination level	<input type="checkbox"/> Department / Faculty <input checked="" type="checkbox"/> Institution		<input checked="" type="checkbox"/> Local <input type="checkbox"/> Regional	<input checked="" type="checkbox"/> National <input checked="" type="checkbox"/> International