FUNFORLAB INTERREG-EMR:

D.T4.2 Suggestions for the development of an action plan for the universities of applied sciences in the MRE region

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Introduction

The past years, professional medical laboratories in the Euregion Meuse-Rhine, especially in Belgium and Germany, have experienced difficulties finding enough qualified medical laboratory technologists (MLT) to meet the demand. This became painfully obvious during the COVID-19 crisis, when medical laboratories had to process enormous amounts of COVID-tests of possibly infected patients on a daily basis. One important reason for the shortage is a low number of students enrolling in an MLT study program. Secondly, medical analyses in professional laboratories have evolved over the past years into mostly automated procedures; this in contrast to the manner in which practical procedures' teaching in MLT schools mostly involves manual techniques. Unfortunately, MLT schools are not able to meet those needs to teach students to work with automatons, as these are very expensive devices, in a quickly evolving field so it would be difficult for schools to afford keeping up to date always. The use of automatons in professional medical laboratories also implicates that students need to learn other competencies, with more emphasis on quality management and data management, for example. Thirdly, cross-border mobility of both students and MLT professionals is very minimal, which is linked to students not being familiar with MLT study programs in another country then the country they live in, but also related to the legal frameworks in Belgium and Germany.

The FUNFORLAB project was designed, to study these issues of the MLT profession, and to attempt to solve at least some of them. The FUNFORLAB Consortium was established with the following Partners:

- University Colleges Leuven-Limburg (UCLL), campus Diepenbeek, Belgium
- Zuyd Hogeschool, campus Geleen, the Netherlands
- Haute École Libre Mosane (HelMo), Liège, Belgium
- RWTH-UK Aachen, Aachen,

As MLT schools, but also:

- CeCoTePe, Liège, Belgium
- FoRS-Hennalux, Belgium

As designers of ICTE tools (i.e. ICT in education)

As associated Partners in the Liège region, Haute École de La Province de Liège (HEPL), Liège, Belgium and Haute École Charlemangne (HECh), Liège, Belgium, were involved in the FUNFORLAB project too.

Description of this deliverable

This deliverable contains recommendations directed to the curriculum development team of the MLT schools, to further develop their MLT study program, to enhance the quality of the training and ultimately to improve mobility across borders.

Part of the recommendations are based on the SWOT analysis, were strengths and weaknesses of the MLT curricula in the EMR, and the MLT profession, were identified and threats and opportunities were defined.
Secondly, a detailed comparison of the MLT curricula in the EMR (of the above mentioned MLT school partners) was prepared. The results are incorporated in this deliverable.
Thirdly, the consortium contacted their national or regional authorities, and the professional organization for MLT in their country. At the final event, a workshop was given to discuss the legal matters of the MLT profession in relation to mobility, with the participants.

Results & Actions to take

SWOT analysis of the MLT curricula in the EMR

Details of the SWOT results can be found in deliverable D.T1.2.3 (SWOT analysis report).
In summary, results were similar between regions in the EMR. Regarding the MLT curriculum, the following recommendations to which actions were defined, are the following:

- Make the MLT study program more visible to pupils in secondary schools, as well as their teachers who often guide them in making a study choice, as well as providing a realistic view on the MLT profession

➢ **ACTION: a point and click game was developed (WP2) and tested (WP3) for creating awareness about the MLT study program and profession, to be used by secondary school pupils and teachers**

- Reduce the impact of not having access to automatons at school for practical teaching
- Increase the interactions students have with the environment of a professional medical lab
- Increase the enthusiasm/motivation of students for studying MLT

➢ **ACTION: a virtual reality (VR) game was developed (WP2) and tested (WP4) for it's use in the MLT study program by MLT students and teachers**

➢ **ACTION: sharing of good practices of MLT schools (D.T1.3.3 strategic plan for the dissemination of good practices; information made available on the FUNFORLAB website)**

- Improve the knowledge of students about the legal requirements of the MLT profession
- Increase mobility of students and MLT professionals

➢ **ACTION: two e-learning were recorded (WP4), one on mobility and the other on legislative matters, for both MLT students as well as MLT professionals (who are interested in studying or working abroad)**

Comparison of the MLT curricula of the Consortium Partners in the EMR

To homogenize/standardize the MLT curricula in the EMR, to improve mobility of MLT students and professionals, eventually to reduce the labor shortage in Belgium and Germany especially, a detailed comparison was made between the curricula of the Consortium and associated Partners.

We analyzed which learning outcomes, MLT disciplines, theory and practical techniques are present and in which year they are taught to the students.

The results of this analysis can be found in the table on the next pages.

Table 1. Curriculum comparison

		Year 1					Year 2					Year 3					Year 4
MLT competence list		HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	ZUYD
Safe Work Practices	Applies the principles of routine practices : traceability, accuracy of gestures, samples management	X	x	X			x	x	X	x	x	x	x	X	x	x	x
	Uses personal protective equipment, e.g. gloves, gowns, mask, face shields, aprons	X	x	X	x	x	x	x	X	x	x	x	x	X	x	x	x
	Applies laboratory hygiene and infection control practices		x	XX	x	x	X	x	X	x	x	x	x	X	x	x	x
	Minimizes possible dangers from biological specimens, laboratory supplies and equipment	X	x	XX	x	x	x	x	X	x	x	x	x	X	x	x	x
	Uses laboratory safety devices, e.g. biological safety cabinets, fume hoods, laminar flow cabinets, safety pipetting devices, safety containers and carriers, safety showers, eye washes	X	x	XX	x	x	x	x	X	x	x	x	x	X	x	x	x
	Labels, dates, handles, stores, and disposes chemicals, dyes, reagents, and solutions according to legislation	X	(x)	X	x	x	x	x	X	x	x	x	x	X	x	x	x
	Handles and disposes sharps		x	X		x		x	X	x	x		x	X	x	x	x
	Stores, handles, transports and disposes biological and other hazardous materials according to legislation	X	x	X	x	x	x	x	X	x	x	x	x	X	x	x	x
	Uses disinfection and sterilization methods		x	XX	x	x	X	x	X	x	x	x	x	X	x	x	x
	Minimizes potential hazards related to disinfection/sterilization methods		x	XX	x	x	X	x	X	x	x		x	X	x	x	x
	Applies measures in response to laboratory accidents/incidents		x	X		x	X	x	X	x	x		x	X	x	x	x
	Applies spill containment and clean up procedures for biological and other hazardous materials		x	X		x	X	x	X	x	x		x	X	x	x	x
	Responds appropriately to workplace emergencies	x		X		x	x	(x)	X	x	x	x	x	X	x	x	x
	Reports and documents all incidents related to safety and personal injury	theory	x	X				x	X	x	x		x	X	x	x	x
Data and Specimen Collection and Handling	Verifies that relevant information is provided for test request			X				x	X	x		x	x	X	x		
	Knows information about sample collection, their transportation and their storage			X			X	x		x		x	x	XX	x	x	x
	Confirms the identity of the patient and performs venipuncture and capillary blood collection to obtain appropriate samples for laboratory analysis			Ø			X	x	Ø	x		x	x	Ø			
	Performs sample collection and chain of custody procedures relating to specimens			(X)			X	(x)		x		x	x	XX	x		
	Adheres to established protocols for labeling and traceability of specimens						X	x				x	x	X	x	x	x
	Delivers specimens taking into account priority and stability			X			X	x	X	x		x	x	X	x	x	x
	Assesses suitability of the specimen for testing			X	x	x	X	x	X	x	x	x	x	X	x	x	x
	Verifies that the pertinent data on the specimen and requisition correspond			X	x		X	(x)	X	x		x	x	X	x	x	x
	Manages data about samples and patient			X		x	X	x	X	x	x	x	x	XX	x	x	x
	Adheres to guidelines for specimen retention, storage, transportation and disposal						X	(x)	X	x		x	x	XX	x	x	x
	Prepares specimens for analysis			X	x	x	X	x	X	x	x	x	x	X	x	x	x
	Identifies, documents and initiates corrective action for pre-examination (pre-analytical) errors						X	x		x		x	x	X	x	x	x

Table 1. (continue) Curriculum comparison

		Year 1					Year 2					Year 3					Year 4
MLT competence list		HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	ZUYD
Analytical Processes	Applies the principles of microscopy:												x				
	bright field	x	x	X	x	x	x	x	X	x	x	x	x	X	x	x	x
	fluorescence	theory								theory	x		x	X		x	x
	polarizing	theory		X					X				?	X			
	inverted	x					x					x	x	theory			
	Applies the physical and chemical principles of staining	x	x	X	x		X	x	X	x		x	x	X	x		
	Assesses the quality of staining and initiates corrective action			X			X	x	X			x	x	X		x	x
	Applies principles of light measuring systems used in common instruments:																
	absorption spectrophotometry		x	X	x	x	X	x	X	x	x	x	x		x	x	x
	reflectometry			X	x		X	x		x		x	x	X		x	x
	turbidimetry			X		x	X	x		x	x	x	x	X		x	x
	Assesses results, identifies sources of interference and initiates corrective action			X			x		X			x	x	X	x	x	x
	Applies principles of electrochemical systems used in common instruments:																
	ion selective electrodes	X			x				X	x		x		X		x	x
	conductance electrodes	X			x				X	x		x		X		x	x
	Assesses results, identifies sources of interference and initiates corrective action								X			X	x	X			
	Applies principles of electrophoresis and chromatography		x					x	X	x	x	X	x	X	x	x	x
	Assesses results, identifies sources of interference and initiates corrective action							x	X			x	x	X	x		
	Applies principles of osmometry		x				X	x	X			x	x	X		x	x
	Assesses results, identifies sources of interference and initiates corrective action						X	x	X			x	x	X			
	Applies principles of immunoassays						X	x	(X)	x	x	x	x	X	x	x	x
	Assesses results, identifies sources of interference and initiates corrective action						X	x	(X)			x	x	X	x		
	Demonstrates knowledge of principles of mass spectrometry			Ø				x	Ø			X	x	X	x	x	x
	Assesses results, identifies sources of interference and initiates corrective action			Ø					Ø			X	x	X	x		
	Applies principles of particle analysis used in common hematology instrumentation			X	x		X	x	X	x		x	x	X	x	x	x
	Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing			X	x		X	x	X	x		x	x	X	x		
	Performs manual counting procedures			X	x		X	x	X	x			x	X	x	x	x
	Demonstrates the knowledge of principles of flow cytometry			X			X	x		x		x	x	X	x	x	x
	Assesses results, indenties sources of interference and initiates corrective action			X			X		X	x		x	x	X	x		
	Applies the principles of hemostasis to perform coagulation testing			X			X		X	x		x	x	X	x	x	x
	Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing			X			X		X	x		x	x	X			
	Performs qualitative and quantitative biochemical analyses			X			X	x	X	x		x	x	X		x	x

Table 1. (continue) Curriculum comparison

		Year 1					Year 2					Year 3					Year 4
MLT competence list		HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	HELMO (Liège)	HEPL (Liège)	UK Aachen	UCLL	ZUYD	ZUYD
	Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing			X			X	x	X	x		x	x	X			
	Prepares blood, body fluids and other clinical specimens for microscopic examination		x	X	x		X	x	X	x		x	x	X	x	x	x
	Identifies and evaluates the morphology of cellular and non-cellular elements in microscopic preparations	X	x	X			x	x	X	x		x	x	X			
	Differentiates between clinically significant and insignificant findings			X				x	X	x		x	x	X		x	x
	Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing							x	X	x		x	x	X			
	Applies principles of immunology to the detection of antigens and antibodies						X	x	X	x		x	x	X		x	x
Analytical Processes	Performs testing to identify common red blood cell antigens and antibodies						X	x	X	x		x	x	X		x	x
	Interprets results to determine phenotype/genotype							x	X	x		X	x	X		x	x
	Differentiates between clinically significant and insignificant antibodies							x	X	x		x	x	X		x	x
	Performs compatibility analyses							x	X	x		x	x	X		x	x
	Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing						x	x		x		x	x	X		x	x
	Prepares and tissues blood products											x	x	X	x	x	x
	Assesses compatibility of donor/product											x	x	X	x	x	x
	Ensures proper storage of blood products						x					x	x	X	x	x	x
	Evaluates the quality of blood products						x					x	x	X	x	x	x
	Evaluates the appropriateness of the blood product for the patient's clinical situation						x					x	x	X	x	x	x
	Describes and investigates the adverse effects of transfusion according to established protocol and initiates follow-up action											x	(x)	X	x	x	x
	Performs analyses to detect and identify common clinically significant micro-organisms	x		X	x		x	x	X	x		x	x	X	x	x	x
	Selects appropriate culture media and environment for isolation			X	x	x	x	x	X	x		x	x	X	x	x	x
	Describes common clinically significant micro-organisms according to body site	x		X	x	x	x		X	x		x	x	X	x	x	x
	Confirms identification using staining techniques, biochemical, serological and automated testing methods	x		X	x		x		X	x		x	x	X	x	x	x
	Applies the principles of instrumentation to the detection of micro-organisms			X	x		x		X	x		x	x	X	x	x	x
	Performs antimicrobial susceptibility analyses			X	x	x	x	x	X	x		x	x	X	x	x	x
	Assesses results, identifies sources of error and initiates corrective action and/or follow up testing			X	x		x	x	X	x		x	x	X	x	x	x
	Applies molecular diagnostic principles to identify nucleic acid sequences							x	(X)	x		x	x	X	x	x	x
	Assesses results, identifies sources of interference/errors, initiates corrective action and/or follow up testing							x		x		x	x	x	x	x	x
	Performs tissue preparation techniques:						X			x		x	x		x	theory	theory
	Grossing (macroscopic analysis)			Ø			X		Ø	x		x	x	X	x		
	Processing			X			X		X	x		x	x	X	x		
	Embedding			X			X	x	X	x		x	x	X	x		
	Sectioning (paraffin and frozen)		x	X				x	X	x		X	x	X	x		
	Assesses quality of the preparation and initiates corrective action and/or follow up		x	x				x	x			x	x	x	x	x	x
	Performs techniques to demonstrate cellular and non-cellular components in tissue and body fluids	x					x	x	X			x	x		x	x	x
	Assesses quality of the technique and initiates corrective action and/or follow up			X				x	X			x	x	X	x	x	x
	Operates and maintains standard laboratory equipment/instruments	x		X	x		x	x	X	x		x	x	X	x	x	x
	Prepares reagents, calibrators, standards and quality control materials	x		X	x		x	x	X	x		x	x	X	x	x	x
	Describes the role of the laboratory in point-of-care testing			x			x		x	x			?		x	x	x
	Performs and assesses point-of-care techniques			x		x			x	x	x	x	?		x	x	x

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nterpretation and Reporting of Result	Recognizes the relationship between analyses, diagnoses, clinical information and treatment by assessing results on the basis of:						x					x	x			x	x
	specimen integrity			x			x		x	x		x	x	x	x	x	x
	reference values			X			x	x	X	x		x	x	X	x	x	x
	critical values		x	X			x	x	X	x		x	x	X	x	x	x
	method limitations, e.g. dynamic ranges, interferences, specificity, sensitivity		x	X			x	x	X	x		x	x	X	x	x	x
	patient delta checks						x			x		x	x	X	x	x	x
	clinical conditions			X			x		X	x		x	x	X	x	x	x
	other laboratory findings			X			x		X	x		x	x	X	x	x	x
	Reports results that meet quality control criteria			X						x		x	x	X	x	x	x
	Identifies unexpected or implausible results and takes appropriate action prior to reporting	x		X			x			x		x	x	X	x	x	x
	Recognizes and acts on critical values			x			x		x	x		x	x	X	x	x	x
	Documents results accurately	x		x					x	x		x	x	X	x	x	x
Quality Management	Demonstrates knowledge of quality systems essentials (QSE)	x					x			x		x	x		x		
	Follows established protocols as defined in policy, process and procedure manuals	x		X	x		x	x	X	x		x	x	X	x	x	x
	Assesses quality control data and calibration data			X	x		x		X	x		x	x	X	x	x	x
	Uses statistics to monitor and track the acceptability of quality control results								X	x		x	x		x	x	x
	Identifies, documents and reports deficiencies that may affect the quality of testing			X					X	x		x	x	X	x	x	x
	Performs and documents preventative maintenance according to established protocols			X					X	x		x	x	X	x	x	x
	Recognizes malfunctions in equipment/instruments, initiates and documents corrective action			X					X	x		x	/	X	x	x	x
	Participates in continuous quality improvement activities			X					X	x		x	(x)	X	x	x	x
	Demonstrates knowledge of risk management									x			x	(X)	x	x	x
	Participates in internal and external quality assurance activities, e.g. proficiency testing, audits, accreditation								(X)	x		x	/		x	x	x
	Demonstrates knowledge of inventory maintenance	x								x			/	X	x	x	x
	Demonstrates information management skills, e.g. computer, laboratory information systems and related technology	x					x			x		x	x	X	x	x	x
Critical Thinking	Demonstrates knowledge of a dynamic environment; adapts and responds to change			x			x		x	x		x	x	x	x	x	x
	Recognizes that change initiated in one area may impact other areas of health care services			X						x			?		x	x	x
	Engages in reflective practice; stops and thinks about practice, consciously analyzes decision making and draws conclusions to improve future practice				x					x		x	?	X	x	x	x
	Organizes work to accommodate priorities	x					x			x		x	(x)	X	x	x	x
	Maximizes efficient use of resources, e.g. time, equipment, personnel						x			x		x	x	X	x	x	x
	Demonstrates effective problem solving/trouble-shooting strategies and initiates appropriate follow up			x			x		x	x		x	x	x	x	x	x
	Contributes to implementation strategies that integrate timelines, resource management and communication related to projects or research/studies			x					x	x		x	/	x	x	x	x
	Practices evidence-based decision-making skills such as literature review, data analysis and research methodologies/studies						x	x	x	x		x	x	x	x	x	x

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Communication and interaction	Practices effective communication with colleagues, patients/clients and other health care professionals:						x					x					
	• Active listening	x		x	x	x	x	x		x	x	x	x		x	x	x
	• Verbal communication	x		x	x	x	x	x		x	x	x	x		x	x	x
	• Non-verbal communication	x		x	x	x	x	x		x	x	x	x		x	x	x
	• Written communication	x	x	x	x	x	x	x		x	x	x	x		x	x	x
	• Conflict management			x		x				x	x		/		x	x	x
	• Identifying barriers to effective communication			x		x				x	x		/		x	x	x
	• Using technology appropriately to facilitate communication			x	x	x	x			x	x	x	/		x	x	x
	Demonstrates effective teamwork skills	x		x		x	x		x	x	x	x	(x)	x	x	x	x
	Demonstrates interdisciplinary/interprofessional team skills:			x		x	x		x	x	x	x	(x)	x	x	x	x
	• Communication			x		x	x		x	x	x	x	x	x	x	x	x
	• Collaboration			x		x	x		x	x	x	x	x	x	x	x	x
	• Role clarification			x		x	x		x	x	x	x	x	x	x	x	x
	• Reflection			x		x	x		x	x	x	x	x	x	x	x	x
	Demonstrates adaptive skills when interacting with patients/clients			x					x	x			(x)	x		x	x
Professional Practice	Maintains confidentiality of healthcare information			x			x	x				x	x		x	x	x
	Complies with legislations that govern medical laboratory technology			x					x			x	x		x	x	x
	Recognizes limitations of own competence and seeks action to resolve						x					x	x		x	x	x
	Obtains informed consent prior to procedure and respects a patient's right to refuse											x	/		x	x	x
	Recognizes potentially dangerous situations and understands the right to refuse unsafe work						x					x	x		x	x	x
	Takes responsibility and is accountable for professional actions												x		x	x	x
	Recognizes the need for and participates in continuing education and training											x	x		x	x	x
	Promotes the image and status of the profession of medical laboratory science as members of the health care team		x					x				x	x		x	x	x
	Recognizes how ethical issues in the health care environment affect the medical laboratory technologist and clients											x	x		x	x	x
	Demonstrates knowledge of the health care system, professional laboratory organizations and their responsibilities						x					x	(x)		x	x	x
	Demonstrates knowledge of the determinants of health and their implications for the laboratory system											x	(x)			x	x
	Respects the diversity, dignity, values, and beliefs of patients/clients and colleagues											x	x		x	x	x
	Demonstrates knowledge of interpersonal skills:						x					x	x		x	x	x
	• Recognizes signs of individual and group stress			X			x		X		x	x	/		x	x	x
	• Recognizes signs of patient stress												/				
	• Exhibits empathy when assisting patients and colleagues			X			x		X		x	x	/	X	x	x	x

From this analysis, it can be concluded that MLT curricula in the EMR are comparable in terms of content (theory and practical training content), and that differences are mainly situated in when topics are offered to students over the years. This is partly due to differences in the total duration of the MLT curriculum which in the Netherlands takes at least 4 years to complete, while in Belgium and Germany, it is a 3-year study.
Furthermore, since in the Netherlands the MLT profession is not a regulated profession (see later in this document when legal matters are discussed), curricular content in Belgium and Germany are set by certain rules such as which MLT disciplines and competences need to be present. This also results in a more 'broad' program in the Netherlands (i.e. 'Applied Science' at Zuyd Hogeschool), with students graduating from this program choosing mainly for a job in research and development or industry (better conditions, see SWOT analysis) while only 5 to 10% of graduated students choose a career as MLT. This is often influenced by the choice for internships they make during the study program, i.e. internships in medical laboratories in hospitals for example.

Analysis of the curricular differences furthermore revealed that in the Netherlands and in Germany, blood collection by venous puncture is missing from the MLT curriculum. This may have implications for mobility, so to start to work in Belgium for example, after graduation, since the Belgian law describes venous puncture as one of the techniques an MLT need to learn about during the study and needs to have the competences to perform independently. Related to this, also communicative competences and related curricular content is less taught in the Netherlands and in Germany. One must however be aware that in all EMR countries, communication is taught in theory and not much in practice.

- **ACTION: in the serious games developed (WP2), a video of a professional performing a venous puncture is incorporated, a long with a quiz about the materials necessary to perform the blood sampling.**

- **ACTION: sharing of good practices of MLT schools (D.T1.3.3 strategic plan for the dissemination of good practices; information made available on the FUNFORLAB website)**

- **ACTION: two e-learning were recorded (WP4), one on mobility and the other on legislative matters, for both MLT students as well as MLT professionals (who are interested in studying or working abroad). This will make them aware of the legal matters and provide them with the websites, contact points addresses etc. to apply for a work permit win another country than the country of qualification**

Similarly, histology is taught mainly in theory in the Netherlands, while in Belgium, students learn the practical procedure of making tissue slices, simple staining procedures, using the microscope to view and interpret the results. In Germany, students in year 3 spend an entire day with a (anatomo)pathologist, to learn histological assessment, only sectioning (preparation of tissue slices) is not done by all students.

- **ACTION: in the serious games developed (WP2), a patient case scenario is incorporated, where the automaton is broken and the player needs to use the manual technique (histology) to perform analysis of the blood cells of the patient**

Remarks:

As there is no legal basis for the minimal hours of practical training an MLT student needs to have in the Netherlands, practical training at school but especially during internships is dependent on the placement of the student.

We are aware that incorporating venous puncture and histology in the games, is not the same as learning a technique by hand yourself. So to solve this issue, either curricula need to incorporate these techniques into their study program, or, MLT schools can send students on an exchange with other schools in the EMR (i.e. mobility) to learn. These exchanges often last at least one week (example of good practice of exchange students between Zuyd Hogeschool and UCLL), so more advantages can be thought of.

Analyses of the differences in legal requirements of the MLT profession in the EMR

The profession of MLT is a paramedical profession, which means that as an MLT, you support a physician in making a medical diagnosis for a patient. An MLT does this by analyzing samples of human origin, such as blood or urine, ensuring the devices to analyze these samples are working properly, by performing quality control checks, and so on. And by doing so, an MLT ensures the quality of the analysis results and therefore the accuracy of the diagnosis.

In most European countries, this MLT profession is also a regulated profession. This means that an MLT needs to adhere to a certain list of rules (legal requirements) to be allowed to work as an MLT in a professional medical lab. These rules are not only applicable to the profession itself, but also to the study program to obtain the degree of MLT. The Netherlands are the only Member State in which MLT is not a regulated profession. Therefore, the following results are a comparison between Belgium and Germany only.

Before taking a look at the specific legal requirements in the 3 EMR countries, some information about the European regulation of the profession is discussed first.

There are two European documents related to regulated professions. The first is the Treaty establishing the European Community [1], which states that free movement of persons and services should be allowed between Member States. In the context of regulated professions, this means that citizens of the Member States have the right to pursue a profession in another Member State (or country) than the one in which they have obtained their professional qualification. The Treaty also states that guidelines should be issued to make this possible.
The EU Directive of 2005 [2] on the recognition of professional qualifications is one of those documents that contains these guidelines. It states that Member States can issue their own rules of the recognition of a degree or a qualification, meaning that it's possible that your degree obtained in your home country might not be enough to work in another country, but that the country you want to go and work, asks for extra compensation measures (for example a trial period to show your competences).
Also in this guideline is written that Member States must establish a network of contact points, with contact persons' names, addresses, phone numbers etc.; for people to address to when you need more information about the legal requirements in that host country, or for assistance in applying for the recognition of your degree. And this should add transparency to the process of applying for recognition.

[1] https://eur-lex.europa.eu/eli/treaty/tec_2002/oj
[2] http://data.europa.eu/eli/dir/2005/36/oj

Most of the information about the legislation can be accessed by links on the EU database for regulated professions (https://ec.europa.eu/growth/tools-databases/regprof/). The scope of the database website, is to provide information on regulated professions, statistics, and also contact points. To help students and MLT professionals to find the correct information, an e-learning video was recorded discussing issues of mobility.

In Belgium, the legal requirements to be allowed to practice the profession of MLT, are stipulated in a Royal Decree [3]. It also contains a list of manipulations an MLT is allowed to perform. The most recent version of this decree was published in 2019, when adjustments were made to meet the current (and future) evolution in professional medical laboratories.

In Germany, the legal requirements are stipulated in the document MT-Berufe-Gesetz, MTBG was recently updated in 2021. This changed the view of the MLT curriculum from a discipline-oriented towards a competency-based approach. Accompanying this legal document, are new rules for the educational program.

The following table (table 2) compares the most important legal requirements of the MLT educational program between Belgium and Germany:

Table 2: comparison of the MLT educational program between Belgium and Germany

	BELGIUM	GERMANY
Study level	EQF 6, 180 ECTS	EQF6, ~4800h, min. 3y max. 5y
Practical training	Internships: 600h total, min. 400h clinical, max. 200h R&D, min. 3 MLT disciplines	Min. 2600h practical instruction at school + min.200h internships
Examination	At school	At school + ends with a state exam
Varia	Students need to keep a logbook	Students receive a salary to study

EQF, European Qualification Framework; R&D, research and development

For more details, we refer to the e-learning on legislation (O.T4.1)

During the final event, a workshop was organized to inform participants about the legal matters of the MLT educational program and the professions, as well as mobility. Using a Wooclap quiz we evaluated their current knowledge about these topics. It was surprising that many of the participants are not fully aware of the legal matters, or the lack of mobility in the EMR.
This underlines the need of informing target groups about this topic.

- **ACTION: two e-learning were recorded (WP4), one on mobility and the other on legislative matters, for both MLT students as well as MLT professionals (who are interested in studying or working abroad). This will make them aware of the legal matters and provide them with the websites, contact points addresses etc. to apply for a work permit win another country than the country of qualification**

[3] https://etaamb.openjustice.be/nl/koninklijk-besluit-van-17-januari-2019_n2019010523.html

More information regarding this deliverable

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