



Operational Port Training Models Using Simulators

Final Report

Public Part

Project information

Project acronym: OPTIMUS
Project title: Operational Port Training Models Using Simulators
Project number: 2008-1913 / 001 – 001 LE3 LEMULP
Sub-programme or KA: Leonardo da Vinci Multilateral Project
Project website: www.optimus-project.eu

Reporting period: From 01/11/2008
To 31/10/2010

Report version: 1
Date of preparation: December 2010

Beneficiary organisation: FEPORTS

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This project has been funded with support from the European Commission.

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Executive Summary

The OPTIMUS project has been aimed at developing a new approach for the design, performance and evaluation of simulation-based training activities in the port and logistics sector. Its main objective has been filling the existing gaps among different ports in simulation-based training by developing and experimenting a common approach on how-to-apply simulation techniques and devices for the operational training of port and logistic sector staff, specifically by:

- developing and testing standardized guidelines and methodologies for designing simulation-based training actions;
- standardizing and implementing performance evaluation procedures and a common system of skills recognizing;
- developing effective Pilot Training Actions for reaching an optimal use of simulators in operational port training actions.

To do so, OPTIMUS has been directed at producing concrete outcomes:

1. Trainers manual “Guidelines and methodologies for Vocational Training in the port sector using simulators”;
2. Evaluators manual “Performance evaluation of simulation-based systems and training actions”;
3. Multi purpose Web portal:
 - Internet website for public dissemination of project results, news and events, e-learning contents and functionalities;
 - Extranet website and communication system for exchanging information between project partners;
4. Pilot Training Actions in the ports of Valencia, Marseille and Livorno
5. Dissemination material: leaflets and books
6. Local level exploitation initiatives and Final Conference.

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1. Project Objectives

OPTIMUS KEYWORDS

❖ INNOVATION

New approach for designing, carrying out and evaluating simulation-based training activities in the port sector

❖ HOMOLOGATION

Standardization of procedures amongst participant Ports

❖ EXPERIMENTATION

Common European approach on how-to-apply simulation techniques:

- ✓ Guidelines and Methodologies;
- ✓ Performance Evaluation System;
- ✓ Simulators Knowledge.

In order to comply with the OPTIMUS main objective of filling the existing gaps between the ports in the simulation-based training, the project partnership has developed, tested and disseminated a **common approach on how-to-apply simulation techniques and devices for the operational training** of port and logistic sector workers.

This has been made through designing and testing standardized teaching methodologies and learning contents, implementing standard performance evaluation procedures, and finally carrying out Pilot Training Actions for reaching an optimal use of simulators in operational port training activities.

Project objectives and how they have been addressed:

- **Support Vocational Training providers:** by developing and testing effective tools for those who want to establish training activities using simulators and need some guidelines to help them to identify the proper equipments to be used and to apply the correct methodologies.
- **Support Operational Workers in the port and logistic sector:** by developing and testing, through pilot experiences, web-based and computer-

based learning contents capable to guiding the trainees in their way to upgrade their skills through simulation techniques.

- **Support VT and HRs development policies of companies operating in the port and logistic sector:** by establishing a system of professional profiles skills evaluation, combining the results of performance evaluation procedures with specific surveys on port professions.
- **Foster innovation:** by establishing a system (manuals, guidelines, procedures, web based learning contents) aimed at favouring the adoption of simulators in the VT sector.
- **Favour the project results adoption:** with the organization of specific dissemination and exploitation initiatives, not only for sharing information about the project results, but also for establishing exploitation policies both with the local port communities and other European ports and organizations.
- **Encourage the transition from traditional on-the-job training towards innovative and measurable methodologies,** making up a system that addresses the needs of:
 - ✓ **Equitability:** providing quality learning whatever the profile of the trainee
 - ✓ **Measurability:** making available methodologies for objectively measuring the trainees performance and reaction capabilities
 - ✓ **Homogeneity:** same level of teaching and learning quality across the time
 - ✓ **Adaptability:** according to technical requirements, the training process can evolve for addressing new needs
 - ✓ **Transparency:** allowing the monitoring of the training process and the progress of the trainees.

Short Term Target Groups

Vocational Training “PROVIDERS”:

- ❖ Training Departments of companies operating in the sector; Public Authorities involved in (Vocational) Training issues; Training Agencies and Professionals; Trainers; Human Resources Departments of global port and logistic sector companies.
- ❖ NEEDS: Simulators are complex and expensive machine, they require specific skills, methodologies and contents for their optimal use. When requested to design, develop, organize, carry out, evaluate simulation-based training actions, people belonging to this group needs precise references for properly proceeding in a quite new sector like this one.

Vocational Training “USERS”:

- ❖ People already working in port or logistic sector companies, more specifically in driving and maneuvering goods handling machines (as mobile cranes, forklift trucks, etc.), unemployed people, first job seekers and more in general people who is willing to work in the goods transport / handling sectors, more specifically where the driving and maneuvering of goods-handling machines is an integral part of the work process.
- ❖ NEEDS: before benefiting of simulation-based training, potential users needs to acquire information about how to interact with a simulator, about procedures to be followed, about the learning contents that will be supplied, in order to properly approaching the simulation-based experience. Moreover, they needs to increase their cognitive skills and knowledge regarding maintenance procedures, safety regulations, and heightened security measures.

Long Term Target Groups

PORT COMMUNITY:

Port companies, workers operating in the port sector and training agencies.

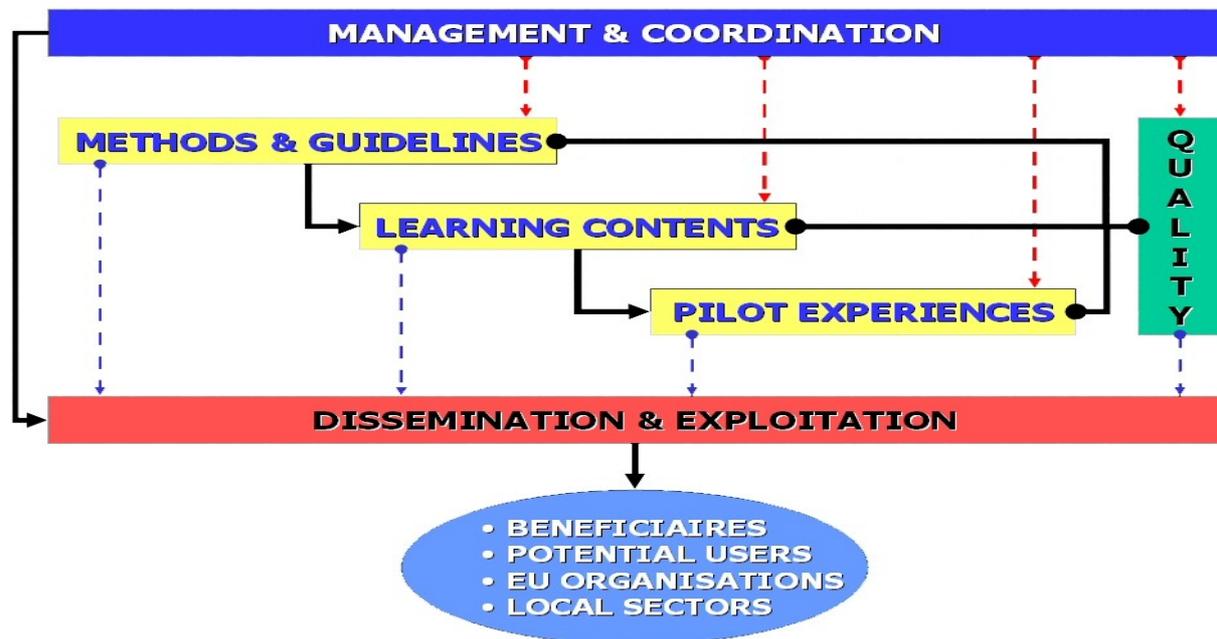
A spread and wide use of simulators for training activities will generate, when achieved, several benefits for the Port Community in its entirety.

Long-Term Advantages of Simulation-based training activities in these sectors:

1. Removal of the costs and expenses of using actual equipments (dockside cranes, warehouse or yard forklift trucks, pedestal cranes for heavy spare parts handling) with the associated:
 - ✓ Equipment operating costs;
 - ✓ Asset depreciation;
 - ✓ Loss of operational capacity of dockside or warehouse operations;
 - ✓ Opportunity for increased damage to crane and dock assets by novice trainees
2. Experienced Crane drivers are taken off the job to instruct new trainees, thereby reducing the efficiency of dockside operations and operator utilisation.
3. While high failure rates can be expected for new recruits up to 50%, simulator training can reduce this rate of attrition.
4. The Simulator provides an opportunity for skill training at an earlier stage, identifying individuals who have and do not have a natural aptitude for crane

In the competitive business of port privatisation and port holding operations, more widely used simulation environments for training could offer a proven competitive advantage and risk management support.

2. Project Approach



In order to guarantee as much as possible outcomes relevance with respect to the users needs, project's activities have been carried out in accordance with the following **progressive approach**:

- A. Methodologies;
- B. Learning contents;
- C. Testing;
- D. Dissemination & Exploitation

while, in parallel, quality monitoring, technical meetings, coordination and management activities allowed the various workgroups to proceed smoothly.

- ✓ Developing material for Vocational Training Providers has been the **first part** of the OPTIMUS activity. During that phase the university research centre has provided the necessary skills for developing technical guidelines and didactical methodologies, while port and logistic sector related partners have provided experts in Vocational Training in order to integrate and calibrate the proposed methodologies to their specific contexts.

- ✓ Developing material for Learners has been the **second part** of the OPTIMUS activity. During that phase trainers coming from the addressed sectors have integrated their skills with experts coming from the IT sector, in order to produce web based and computer based learning contents.
Furthermore, the university research centre have cooperated for adapting the developed methodologies to the contents delivery.

- ✓ Carrying out pilot experiences has been the **third part** of the OPTIMUS activity. During that phase specific target groups has been recognized and addressed by Pilot Training experiences, coordinated by experts coming from the same sectors.

3. Project Outcomes & Results

	2008		2009										2010											
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	S	O	
wp1				1A			1B				1C													
wp2							2A				2B		2C				2D							
wp3																	3A				3B		3C	
wp4				4A									4B				4C						4D	
wp5							5A						5B				5C							5D
wp6																	6A				6B		6C	
wp7	7A			7B			7C				7D		7E				7F				7G		7H	7I
wp8	8A			8B		8C	8D				8E	8F	8G				8H				8I		8L	8M

The **first 12 months** of the OPTIMUS project life have been used for preparing the necessary theoretical and technical “infrastructures” needed for developing and carrying out the subsequent OPTIMUS core-activity, i.e. Training Actions.

In particular, on the theoretical side have been produced the Manuals for Trainers and Evaluators, while on the technical side has been developed the OPTIMUS web portal (www.optimus-project.eu), a global website that acts as Dissemination Portal, Extranet and Communication System and web-based E-Learning Platform.

As OPTIMUS has been intended to provide immediately usable outcomes, each WP has been expected to deliver outcomes addressed both to specific users needs and to be part of the a wider system in developing, carrying out and evaluating simulation-based training activities.

Through exploiting the guidelines and the web infrastructure produced in the first year of activity, during its **second year** of life the OPTIMUS partnership has carried out all the activities related to the actual application of the first year results, specifically with the execution of the Pilot Training Actions in each port.

Moreover, over the last months of the project life, after having executed the most part of the training activities and produced the most part of the evaluation reports, OPTIMUS partnership has had the opportunity (and the appropriate material) for organizing and holding Dissemination and/or Exploitation Meetings and Conferences, in order to demonstrate project’s outcomes and results at a wider level, with the aim

of sharing a common point of view over the “learning through simulation” matter with relevant subjects, stakeholders and target groups.

In details (see also table above):

- **WP1 Outcomes (Methodologies and Guidelines)**
 - ✓ **1A** - (report) - State-of-the-art: Survey on Simulation in Port Environments
 - ✓ **1B** - (handbook) - Guidelines and methodologies for Vocational Training in the port sector using simulators
 - ✓ **1C** - (handbook) - Performance evaluation of simulation-based systems and training actions

- **WP2 Outcomes (Web-based Learning Contents)**
 - ✓ **2A** - (report) – transfer of results from WP1 (Methodologies) and WP5 (Web Portal & E-Learning Platform) and definition of the learning contents
 - ✓ **2B** - (report) - Intermediate Report about Learning Contents development
 - ✓ **2C** - (steering committee) - Validation of the Learning Contents
 - ✓ **2D** - (web) - Final publication of the learning contents

- **WP3 Outcomes (Pilot training Actions)**
 - ✓ **3A** - (steering committee) - Definition of specific target groups and testing modalities
 - ✓ **3B** - (training) - Carrying out of Pilot Experiences in the ports of Valencia, Marseille and Livorno
 - ✓ **3C** - (steering committee) - Communication about Pilot Training Experiences
 - ✓ **3D** - (report) - Final Common Report on Pilot Training Experiences

- **WP4 Outcomes (Quality Management)**
 - ✓ **4A** - (manual) - OPTIMUS Quality Plan, Manual and Procedures
 - ✓ **4B** - (report) - Intermediate Report on OPTIMUS Quality issues
 - ✓ **4C** - (forms) - Delivery of material for Feedback Management during Pilot Exp.
 - ✓ **4D** - (forms) - Final Report on OPTIMUS Quality Outcomes

➤ **WP5 Outcomes (Dissemination)**

- ✓ **5A** - (web) - OPTIMUS Web & Dissemination Portal
- ✓ **5B** - (brochure, book) - OPTIMUS Brochures, Leaflets and books
- ✓ **5C** - (event) - Dissemination initiatives at local and project level
- ✓ **5D** - (event) - Final Conference

➤ **WP6 Outcomes (Exploitation)**

- ✓ **6A** - (report) - Definition of the OPTIMUS Exploitation Strategy
- ✓ **6B** - (event) - Exploitation initiatives at local and project level
- ✓ **6C** - (web) – Communication Exploitation Activities and Results

➤ **WP7 Outcomes (Coordination and Secretariat)**

- ✓ **7A** - (minutes) - Meetings Minutes and Material
- ✓ **7B** - (files) - Computer Based Templates and Manual for Financial Rules
- ✓ **7C** - (website) - Web Platform and Communication System

➤ **WP8 Outcomes (Project Management)**

- ✓ **8A** - (meetings) - Meetings Organization
- ✓ **8B** - (report) - Intermediate and Final Project Reports
- ✓ **8C** - (report) - Communication and Documentation requested by EAC-EA

The above mentioned outcomes have been produced in strict accordance with the provisional activity and timing plan, with no or little delays, due to a well balanced work distribution and to a good response from the project partnership, already experimented in previous projects.

4. Partnerships

The first consideration taken into account has been the necessity of involving into the partnership subjects belonging to that sectors who are incoming in the simulation-based training and who are facing similar problems. In particular, ports organizations who have set up Vocational Training Centres provided with simulation devices and who are seeking the proper methodologies and didactical contents for optimizing the use of their equipments for developing training actions.

Another important aspect to comply with, has been the setting up of a consortium capable of covering, without significant overlapping, all the skills required for assuring a proper project functioning, also considering the project aims: this has implied the necessity to combine into the partnership the following kinds of subjects:

- **Port Authorities:** as representatives of their local Port Communities and as organizations involved in operational activities, these subjects will not only provide the various workgroups with their technical skills, but also they will positively use their role of public representatives for fostering both vertical and horizontal dissemination and project results adoption by the end users.
- **Port Workers Companies:** these are subjects that are managing operational port activities on a daily basis, involving a large number of workers and also providing them the necessary training actions. The participation of a Port Workers Company is considered as necessary both for aiding the development of technical workpackages and for leading the pilot experiences phase.
- **University Research Centre:** a research centre strongly involved in designing and implementing applied systems in virtual reality and in developing simulators will provide the necessary skills for the analysis of the methodologies and the definition of the guidelines for developing training activities in simulated environments.

- **Coordinating Organization:** considering the huge amounts of deliverables and activities foreseen in the OPTIMUS project, the participation of an organization highly experienced in EU projects coordination is crucial for assuring an effective information flow between co-ordinator and WP leaders, for carrying out the day to day communications and for providing technical assistance for the preparation of all the periodic and supplementary reports (technical and financial).
- **Quality Monitoring:** considering that standardization and homologation of methodologies and products are an essential part of the OPTIMUS strategy, especially in view of the dissemination activities and for the setting up of a system potentially exploitable at European level, a quality plan and a constant quality monitoring will be a specific task of the project, requiring the participation of a partner experienced in that issues.

Moreover, the most part of OPTIMUS consortium partners have already successfully cooperated in previous EU projects. Retaining the same partnership has produced positive effects in terms of guaranteeing a better and smoother project functioning.

Activity distribution:

In view of entrusting each partner with activities and responsibilities suited with respect to its potentialities, the following set of principles has been considered:

1. **Collaboration.** No WP is under the total responsibility of a single organisation. The outcomes will be the result of a collaborative work.
2. **Complementarity.** Workgroups have skills in different domains that complement each other.
3. **Flexibility.** The domains of competence are not strictly disjoint. This increases the efficiency of the cooperation between partners that have knowledge in common, and doesn't restrict their contribution to the overall mission of the project.
4. **Commitment.** All the institutions that manifested the interest in the OPTIMUS project expressed their strong commitment to participate to the realization of the objectives and to the project activities.
5. **Excellency.** The partners in the Consortium have a long time qualified experience in the activities they are being committing to fulfil the project development, and complement each other in their tasks.

6. **Former cooperation.** The proponents consider to carry out the activities proposed in a tight collaboration in order to be able to profit from the synergies generated and the shared mixed experiences. The members of the consortium consider to be able in success the cooperation since they have already cooperated before in other EU projects.

As far as the detail of activity distribution is concerned, it's important to note that each partner participates to each WP: however, this doesn't mean that a generic efforts distribution has been followed. Instead, each partners has had its own responsibility in each WP. As a general rationale, each WP has been leaded by the partner who can deploy the better skills for the WP aims, while other partners help the leader providing him with their specific competencies. A detailed staff working days plan has been developed for each WP, taking into account each partners potentialities with respect to the WP aims.

FEPORIS (VALENCIA, ES) - Fundación Instituto Portuario de Estudios y Cooperación de la Comunidad Valenciana

As Applicant Organization, FEPORIS will be responsible to coordinate all the works of the partners and will oversee all technical, administrative, financial and legal issues.

As subject interested and actively involved in developing studies & research, education & training, cooperation and culture in the port sector, FEPORIS will be also an active partner in the WorkPackages devised for developing and testing innovative methodologies and contents for learning through simulation and disseminating the project results, providing to the various workgroups its technical skills and positively using its role of public representative of a whole port community for facilitating both vertical and horizontal dissemination and project results adoption by the end users.

Leaded **WP5** (Dissemination) **WP6** (Exploitation), **WP8** (Management). Participated to all other WPs.

AUTORITA' PORTUALE DI LIVORNO (LIVORNO, IT)

Having already managed and/or coordinated a wide variety of EU projects, Livorno Port Authority will act as Coordinating Organisation, organising and assuring the information flow and methods between co-ordinator and WP leaders, carrying out the day to day communications with the EC and the Steering Committee.

As subject interested and actively involved in developing innovation for Vocational Training in the port sector, specifically managing a Simulation Centre, Livorno Port Authority VTC will be also an active partner in the WorkPackages devised for developing and testing innovative methodologies and contents for learning through simulation and disseminating the project results, providing to the various workgroups its technical skills and positively using its role of public representative of a whole port community for facilitating both vertical and horizontal dissemination and project results adoption by the end users.

Led **WP7** (Coordination and Secretariat). Participated to all other WPs.

SEVASA (VALENCIA, ES) - Sociedad Estatal de Estiba y Desestiba del Puerto de Valencia

As subject who manages operational port activities on a daily basis, involving a large number of workers and also providing them the necessary training actions, SEVASA will provide the various workgroups with its experts, trainers and skills, providing support for the development of technical workpackages.

Moreover, as subject already experienced in carrying out simulation-based training activities, the will lead the pilot experiences phase.

Led **WP3** (Pilot Training Experiences). Participated to all other WPs.

GRAND PORT MARITIME DE MARSEILLE-FOS (MARSEILLE, FR)

As subject directly involved in port operations and interested in developing innovation for Vocational Training in the port sector, specifically managing a Simulation Centre, Port of Marseille Authority VTC will be an active partner in the WorkPackages devised for developing and testing innovative methodologies and contents for learning through simulation and disseminating the project results, providing to the various workgroups its technical skills and positively using its role of public representative of a whole port community for facilitating both vertical and horizontal dissemination and project results adoption by the end users.

Leaded **WP2** (Development of Didactic Contents). Participated to all other WPs.

PERCRO LAB. (PISA, IT) - Laboratorio PERCRO della Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna di Pisa

PERCRO has been involved into several national and international projects for the design and implementation of applied systems in virtual reality. On the basis of the experience gained in several projects concerning the design and development of simulators, within the OPTIMUS project PERCRO will be involved in the analysis of the methodologies and definition of the guidelines for training activities performed in a simulated environment.

Furthermore PERCRO activity will deal with the analysis of the parameters that will permit to check the level of transfer of knowledge.

Leaded **WP1** (Development of Methodologies). Participated to all other WPs.

RRC KOPER (KOPER, SLO) - Regionalni Razvojni Center Koper

Considering its huge experience in participating at European level projects and the specific skills in business, economy and human resources development that it can provide to the project activities, RDC Koper will act as Quality Controller of the OPTIMUS project advances and outcomes, elaborating a Quality Plan and continuously verifying its implementation.

Leaded **WP4** (Quality Monitoring). Participated to all other WPs.

5. Plans for the Future

The partners of the project have the intention to use the results of the project once finalized this, mainly the course online that is an innovation in the field of the formation of crane men for the load and unloading of containers.

This course will be helpful for the formation of new dock workers not only in the participant ports in the project but in all those that wish to give this formation to their workers.

The idea on the part of the Spanish partners is even being matured to realise a prospection between the ports of South America to verify the possible acceptance of the course online and later to act consequently. This way can be a window of penetration in subjects of formation in these ports.

In principle has only been able to write up the course online for crane men, but as the collaboration between the partners is going to continue they tries to also start up other special courses for another type of machines as they can be trastainers and reach stackers.

6. Contribution to EU policies

There are two main considerations on the basis of which has been considered as necessary the implementation of OPTIMUS proposal at a European level rather than at a national or regional one:

1. **Simulators market is small in numbers but global in scope**, important in revenues and capable of generating high-level innovations, added-value and impact in the sectors in which it operates.
2. **Simulation-based training = skills standardization and homologation = mobility**

As far as the first consideration is concerned, we have to take into account that Vocational Training Providers who are willing to deal with simulation-based training activities must solve a wide variety of technical, methodological, organizational and financial problems before starting their activities in this sector. Thus, a project that aims at addressing that needs, as the OPTIMUS one, cannot be developed at a local level, mainly for the following reasons:

- There is a strong need to compare the very few and spread across Europe existing experiences, to select amongst them decisions, practices, equipments that have best fit the users needs and that are promising of generating the better results and there is the necessity to set out common approaches in order to develop guidelines and methodologies that can be used profitably by other organizations.
- Moreover, such organizations, potential users of (a part of) the OPTIMUS results could be located everywhere in Europe, specially where ports and logistic facilities are located. In the light of this, OPTIMUS project could not properly address their needs if developed at local level.
- OPTIMUS project aims at fostering the use of simulators for training activities, favouring their adoption as much as possible in Europe, in order to achieve its short and long-term objectives. Only a European level project could guarantee the requested scope and framework for achieving such goals.

As far as the second consideration is concerned, we have to take into account that from a wider, European-level, point of view in Vocational Training issues, favouring

the use of simulators for operational-training actions implies a concrete possibility to achieve a stronger homologation amongst the interested subjects. In facts:

- Learning through simulators is the right way for **standardization** and lead toward quality and high performance learning, allowing the development of a training system that will be equitable, measurable, progressive and coherent, homogeneous, adjustable and transparent;
- Methodologies **homologation** amongst EU ports will boost the project's European dimension, by setting up and disseminating a sectoral skills recognition system and allowing workers mobility in the addressed sectors.

At European level, the need to standardize expertise and skills related to professions in the various sectors, in view of promoting mobility and interchange is becoming more and more evident (Decision 2241/2004/EC of the European Parliament and of the Council on a single Community framework for the transparency of qualifications and competences). And likewise in the European port sector, which is traditionally particularly exposed to work internationalisation processes, the need to standardize job profiles is very strongly felt.

In this context, common shared simulation methodologies and training contents can constitute a significant pillar in implementing these policies, thanks to the standardization of training processes and the consequent capacity to certify the professional expertise and skills that they can create. Indeed, the setting up of common training platforms among various European countries aimed at conducting training according to common standards, will guarantee the achieving of the minimum objectives foreseen in the legislation regarding common entry-training. Once more, this means a step forward in the process of a EU level standardization of training pathways and professions.

In the light of this, and also considering that Vocational Training providers with low-or-no-skills on simulation are one of the most relevant project's target groups, we can easily understand that OPTIMUS results' potentialities are not limited to the participating partners, but can be extended also at a wider European level, providing potential beneficiaries with information, procedures and methodologies for facilitating the adoption of simulators in their training plans.

