INNOVATIVE CONCEPTS FOR KNOWLEDGE EXCHANGE, MOBILITY AND EXPERTISE IN RAIL FREIGHT AND LOGISTICS

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Abstract
This paper aims to provide an overview of a Rail Freight and Logistics curriculum development project co-funded by the Erasmus Programme of the European Commission. The main objective of this project is to develop master courses on rail freight and logistics. The courses will be compatible to allow for students to do some of their modules at one of the other universities. For both simplicity and the purposes of this paper we shall call it “the project” The project incorporates innovative concepts for knowledge exchange, mobility and expertise in rail freight and logistics education and continuous learning; discussion of which is presented in this paper. The paper also calls upon rail freight and logistics professors and assistants, fellow researchers, policy and decision makers, and stakeholders to liaise with the project team and assist in better understanding the current and future needs for rail freight and logistics higher education, training and promotion.

Keywords
Rail Freight and Logistics, Higher Education, Innovation

INTRODUCTION
We live in a stirring world. Knowledge exchange, mobility and expertise are all drivers for a common good. Education and training for more skills are needed than ever before. Jobs related to Rail Industry and Logistics Systems require a higher
level of skills and better qualifications. And therefore there is a global need for innovation in the field.

In the Freight Transport Logistics Action Plan of The European Commission (COM(2007) 607 final) it is stated that “today, training provided by universities and other institutions varies greatly in Europe. Efforts are required to focus and enhance the qualifications of logistics personnel, notably by strengthening competence in transport, and to support lifelong learning. The lack of consistency and uniformity of education and training in the European universities motivated us to develop this work.

The objective of this paper is to provide an overview of a Rail Freight and Logistics Curriculum development project. The aim of this project is to develop Masters’ Courses. These masters’ courses will be delivered by the participating institutions as separate but shared programmes in their Universities. Our approach is to analyse, evaluate, add, enhance and adapt existing courses already offered by the Universities of the participating institutions in the context of a new rail freight and logistics programme.

The outstanding idea of this project is that the courses developed would run in all four participating institutions, and they would be compatible to allow for students to do some of their modules at one of the other universities. We also explore the possibility of a joint programme and degree. The first two years of the project specify the development phase, after which we will have a better view of what outcome is realistic (i.e. compatible modules ‘only’ or joint course/degree).

The masters’ courses developed will incorporate cultural and international elements of rail freight and logistics education and continuous learning, which are quite diverse and highly varied in Europe.

The suggested scenario is that each university awards degrees to their own students, however intensive Erasmus mobility to the other institutions will be encouraged, with full recognition of modules taken. Possibility of joint degree is envisaged to be explored throughout year 1 and year 2 of the project and considered at year 3 of the project. At the end of year 2 Erasmus Mobility Agreements among the 4 participants are scheduled to be signed.

CONSORTIUM

Apart from UK participation, the project team includes participants from Bulgaria, Italy and Germany. All these participants will bring different knowledge and expertise to the project.

More specifically:

The University of Newcastle upon Tyne (UNEW) represented by NewRail leads the project. UNEW is responsible for the organization of all project meetings and workshops, development of rail freight and logistics curriculum, its implementation, and exploitation of project results.

Apart from the foregoing tasks, UNEW contributes to other tasks as follows:

- A state of the art survey on educational programmes and practices;
- Analysis of demand for rail and logistics higher education and continuing education revealing the current situation in the UK;
- Organization and preservation of database on demand for rail higher education;
- Modelling of curriculum assisting the software development;
- Development of Curriculum framework and identification of compulsory vs. optional subjects;
- Validation of project outcomes;
- Development of Strategies and Plans for staff and students’ mobility;
- Dissemination of information and translations of material, where envisaged.

Sapienza” Università di Roma represented by Dipartimento Ingegneria Civile Edile e Ambientale (DICEA). DICEA brings knowledge and expertise from Italy. DICEA’s contribution is to contribute to teaching modules on Rail Freight Operations; Freight Terminals, Railway Freight Equipment Design. DICEA will also host a workshop in Rome to validate the curricula developed in due course.

The Higher School of Transport “Todor Kableshkov”, Sofia, Bulgaria (VTU) brings knowledge and expertise from Eastern Europe. VTU contributes to the development of modules such as: Industrial Management and Logistics; Organization and Management of Rail Freight Systems; Rail Freight Business Cases; Marshalling Yards. VTU is also responsible for the development and maintenance of the project website as well as dissemination of project results.

The University of Applied Science in Ingolstadt, Germany (Ingolstadt University) utilizes its expertise in computer science to develop a modelling tool for optimizing curricula. Ingolstadt university will also be contributing to modules that encompass: CAD systems, Monitoring, Tracking and Tracing Systems, ITS, E-Tools in rail freight and logistics.

ASSOCIATED PARTNERS

The project also promotes intensive collaboration between Academia and Industry. Therefore, apart from the core consortium the project incorporates 9 associated partners from different EU countries in its team.

The associated partners are different institutions from the rail freight and logistics industry.

Their role in the project is threefold, as follows:

1. to facilitate the data collection for analysing demands for rail freight and logistics higher education;
2. to assist in developing modules and teaching material;
3. to validate the curricula developed.

The associated partners are, as follows:
It should be noted that the project is not restricted to the core consortium and the 9 associated partners; quite on the contrary. We intend to grow by liaising with other national and international campuses and companies specializing in rail freight and logistics. Therefore, the paper also calls upon rail freight and logistics professors and assistants, fellow researchers, policy and decision makers, and stakeholders to liaise with the project team and assist in better understanding the current and future needs for rail freight and logistics higher education, training and promotion.

We wish to expand over time and network with the world. We will seek to promote dialogue and cooperation with Third Countries in the field of rail freight and logistics. It is our long term intention to liaise with higher education institutions in Third Countries providing transport and logistics education. We shall explore opportunities for knowledge exchange, unchaining their potential and capacity and mobility between our Universities and Universities in Third Countries such as RMEI (French acronym for Mediterranean Network of Engineering Schools) as well as Universities from South Europe, North Africa and Middle East.

**ACTION SPECIFIC INFORMATION**

The project employs a multi-action approach involving a combination of:

- management activities and quality assurance;
- state of the art and review surveys and demand analysis;
- development of curricula and open source modelling software tools;
- development of a stepwise methodology for validation of curricula and its implementation;
- organization and conduction of workshops;
- a wide spectrum of exploitation work such as collaborative learning with stakeholders and innovation through distance-/e-/blended learning, implementation of curricula developed into practice, real-life demonstration of the implementation of the curricula accompanied with mobility patterns;
- a wide spectrum of dissemination work such as Web/site design/development equipped with E-forum and Semi-annual newsletters;
- development of a technical memorandum consisting of a stepwise approach for establishing a joint degree MSc programme and strategies for future action after successful completion of the project;
- development of a handbook consolidating all the project merits and contributions to a cohesive document that provides necessary information for everyone interested in rail freight and logistics higher education at large.

The duration of the project is 36 months, where 2 years of development followed by 1 year of implementation are scheduled. The whole project is organized along WorkPackages (WPs) and Tasks within each WP and is developed in a cumulative fashion, meaning each WP dependent, to a certain extent, on the material in the proceeding WP. Nine consecutive and parallel WPs are conducted in achieving the project objectives. To each WP a responsible participant is allocated, however the whole team works in a collaborative manner to produce all the outcomes and products of the project. Thirty-three deliverables are scheduled to be produced during the project lifetime, each of which has a specific nature describing its purposes. Every deliverable is considered as a milestone with significant importance for the project.

The WP type, title and timescale are, as follows:

<table>
<thead>
<tr>
<th>Workpackage number</th>
<th>Workpackage type</th>
<th>Workpackage title</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EXP</td>
<td>Management</td>
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<td>36</td>
</tr>
<tr>
<td>2</td>
<td>QPLM</td>
<td>Quality Plan</td>
<td>1</td>
<td>39</td>
</tr>
<tr>
<td>3</td>
<td>DEV</td>
<td>State of the Art</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>DEV</td>
<td>Modelling of Curriculum</td>
<td>7</td>
<td>38</td>
</tr>
<tr>
<td>5</td>
<td>DEV</td>
<td>Identification of Framework</td>
<td>7</td>
<td>38</td>
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<tr>
<td>6</td>
<td>DEV</td>
<td>Curriculum Development</td>
<td>13</td>
<td>24</td>
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<tr>
<td>7</td>
<td>DEV</td>
<td>Validation</td>
<td>19</td>
<td>24</td>
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<tr>
<td>8</td>
<td>KAP</td>
<td>Exploitation and Implementation</td>
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<td>39</td>
</tr>
<tr>
<td>9</td>
<td>DISS</td>
<td>Dissemination</td>
<td>1</td>
<td>26</td>
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</tbody>
</table>

A Short description of each WP comes next:

**WP1 Management:** coordinates and monitors the progress of individual team members and tasks, articulates the progress in a timely manner with the Education, Audiovisual and Culture Executive Agency (EACEA) via progress reports and according to the programme instructions. Within WP1 the project budget is administered and co-ordinated according to the programme instructions. Within WP1 the project budget is administered and co-ordinated according to the programme instructions.

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**WP2 QPLM:** quality plan

**WP3 DEV:** state of the art

**WP4 DEV:** modelling of curriculum

**WP5 DEV:** identification of framework

**WP6 DEV:** curriculum development

**WP7 DEV:** validation

**WP8 KAP:** exploitation and implementation

**WP9 DISS:** dissemination
**WP2 Quality Plan**: ensures that the required quality of all the products produced within the project is achieved. The objective of Quality Plan (QP) is to ensure all project deliverables meet their respective objectives and achieve high quality standards. Deliverable consistency is also checked against the Description of Work, the relevant milestones, the programme objectives, and the current state of the art. The quality procedure of the project is in accordance to the ISO-9001 standard.

**WP3 State of the Art**: collects, analyses and evaluates the existing relevant programmes in the Universities of the participating institutions and also programmes in other Universities and Institutions for Higher education from all over the world, where applicable. This WP also conducts a State of the Art survey on existing techniques for modelling curricula. WP3 provides an important input for the development of WP4 and WP5.

**WP4 Modelling of Curriculum**: creates a modelling tool (a software) for optimizing curricula. Generally speaking, this product is envisaged to operate with students demand and their background and generates alternative curricula. This WP interacts with WP5 on Identification of Framework.

We take the modelling exercise a step further by identifying computer-aided ways to allow us to optimize the existing curricula to meet different stake holders needs, e.g.:

- industry needs to ensure well educated graduates;
- students needs to ensure both a well balanced workload during the studies and a suitable duration of study;
- lecturers needs to ensure a timetable that allows lecturing all topics in time;
- university needs to ensure attractive courses by reusing existing modules to fully load them.

**WP5 Identification of Framework**: begins by analysing the demand for rail and logistics higher education where special emphasis is placed on rail freight and logistics. The results obtained from this analysis are shared with WP4. Next, based on the material developed within WP3, WP5 identifies and sets the framework of the rail freight and logistics curriculum. The framework is envisaged to consist of compulsory and optional disciplines/courses/modules. WP5 provides an important input for the development of WP6.

**WP6 Curriculum Development**: develops teaching materials (both lectures and home assignments) and further identifies what discipline/course/module to be taught where among the Universities of the participants. To each discipline/course/module a responsible person with outstanding relevant experience is allocated.

**WP7 Validation**: validates the material developed throughout the whole project (i.e., inventory of courses and practice, modelling tool, framework, teaching material, curricula) according to educational standard for MSc and proposes improvements and/or adjustments, if needed.

**WP8 Exploitation and Implementation**: An important stream within the project is the development of the project exploitation plan and its implementation. The exploitation plan outlines and schedules all the exploitation work throughout the lifetime of the project and leads to the development of an electronic technical memorandum that consolidates all the material produced within the project to a one cohesive document and publishes it on the webpage of the project. The technical memorandum provides necessary background and important information to assist individuals and potential beneficiaries interested in the project outcomes, impacts and contributions. Within this WP, the material developed throughout the whole project is implemented in the universities of the participants. Admission criteria are specified. Mobility schemes of staff and students are envisaged to be identified and ERASMUS mobility agreements signed in order for the courses developed to be delivered.

**WP9 Dissemination**: aims to basically establish dissemination channels within the academia as well as the broader users’ (i.e., practitioners /professionals/potential beneficiaries) community. More specifically, WP9 is envisaged to develop the Project Dissemination Plan and establishes the project website that consolidates project objectives, plan and progress to one physical location. This WP also develops and monitors E-Forum to establish a legitimate environment for discussions and ensure dialog with external stakeholders. We intend to produce and disseminate semi-annual electronic newsletters. These newsletters consist of a minimum of one letter sized page and highlight progress to date.

The WP flow chart showing the level of interdependency between the WPs of the Project is, as follows:
TARGET-GROUPS

We target individuals and institutions showing will for knowledge and creative thinking to be utilized for sustainable development and driving social economic progress. Then, it is our responsibility to give our alumni a tremendous head start when looking for jobs.

Education in a purely academic vacuum has probably never been sufficient to prepare students for the "Real-World". Academia and Industry, when it comes to practical subjects such as transportation and logistics, should go hand in hand. Rail Freight and Logistics involve a vast range of both academic and practical subjects such as: systems analysis, operations research, policy-making, computer science, supply chain management, freight flows, economics, climate and greening, safety and security. That is way, to ensure best results from our sustainability agenda we wish to partner with associated partners from rail and logistics industry at large. We do not act in our own. On the contrary, Academia and Industry work together for a common benefit.

We also liaise with national and international Students Organizations and Associations. We convoke and conduct formal meetings and round-table discussions with students in the Universities of the participating organizations. "Admission-free" road-shows are organized on a frequent basis. Presentations are delivered to introduce the project ideas and objectives as well as shorter and longer term visions to interested parties. We do anything possible to give the necessary level of care to identify and liaise with all interested parties over time.

We wish to grow. We wish our activities to be worldwide. Therefore, new participants and campuses active in rail freight and logistics are invited to join in with us in order to enlarge potential and capacity. Opportunities and possible ways for enlargement are to liaise with other rail-, transport- and logistics-oriented networks, training groups and / or consortia.

Potential targets are, for instance, RETRACK [2], TUNRAIL [3] and B2BLOCO [4] as well as TRAINER EU-IEE [6].

- RETRACK is a FP6 demonstration project of the European Commission within which material for rail staff training are developed and disseminated;
- TUNRAIL is a policy oriented measures project co-funded by the Atlantis Programme [5] intended to tune and intensify the rail higher education knowledge exchange and collaboration between the EU and the US;
- B2BLOCO is a Baltic to Balkan Alumni Network for Logistic Competence Project established with the purpose of offering information and knowledge transfer about business practice-oriented results of RTD projects within logistics and transport, and also raising awareness to SMEs for existing opportunities and innovations in the field;
- TRAINER EU-IEE project for railway vehicles eco-driving learning.

CONCLUSIONS

The paper aimed to inform that an MSc in Rail Freight and Logistics is being developed in 4 EU Universities that incorporates innovative concepts for knowledge exchange, mobility and expertise in higher education and continuous learning. This project is well under way and includes innovation with elements of sustainable development by getting experts to rub shoulders and act outside their field because "rail freight and logistics" is a multidisciplinary field by nature.

The project will facilitate to move students away from specialized academic training towards new computer systems, research-driven solutions and real-life problems using alternative ways of learning, which encourages creative thinking and has a positive effect on driving economic progress in society at large.

After the successful completion of the project the participating institutions will deliver the courses developed as separate but shared programmes in their Universities. Strategies and plans for mobility of staff and students between the participating institutions will be set up and the shared programmes will become self-sustainable in the coming future.

The paper also calls upon rail freight and logistics professors and assistants, fellow researchers, policy and decision makers, and stakeholders to liaise with the project team and assist in understanding the current and future needs for rail freight and logistics higher education, training and promotion.

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REFERENCES

