FRAME DESIGN FOR THE POSTGRADUATE COURSE IN LOGISTICS

1. INTRODUCTION.

The present report expects to gather and show all the ideas, initiatives and information for the approach and development of the framework in which the master course in Logistics will be defined and designed. This master course will be imparted jointly by the four European participant universities in the Erasmus Project (consortium members): Cardiff, Cartagena, Linköping and Ljubljana.

The " brainstorming " technique let the consortium members obtain a list of characteristics and requirements for the master course. This list will be quite long to show a wide vision of the existing European training programs in Logistics, in order to set the main structure topics and concepts for the new master course in Logistics, concretely: objectives, modules, minimum requirements, teaching methodologies, evaluation, etc.

2. BRAINSTORMING AIM.

Each work group of the universities, as well as other external collaborators to the universities, have outlined, based on a series of concepts or defined topics along the consortium meetings, the characteristics that it should consider, from their own point of view, the new European master program in Logistics, starting working from the market analysis carried out by each project member in his/her country.
 In that way, the vision of current state in formation and training in Logistics inside the European environment let suggest the main characteristics of the new European master in Logistics.

So, with the objectives of the brainstorming we are trying to achieve the definition of the framework and the design of the main characteristics that should have a master course in Logistics inside the new European space of teaching.
These objectives are:
- Clearly visible extra- value over existing courses
- Strong focus on simulation , experience and creating of new knowledge
- Open for change, continuous improvement and extension
- Make students part of the course, not only recipient.
- Combine international background with electronic course delivery.

3. COMBINED BRAINSTORMING

Each consortium member (university workgroup) carried out a brainstorming, considering the following topics:
1. THEME: Innovative elements and extra-value (over existing courses)
2. target group, requirement for admission
3. ideas for e-learning concept
4. scope of modules: both combination, traditional modules + real cases

Likewise, all the topics the new model of master course in logistics should include can be shown through a model, which consists of four layers: administrative layer, contents layer, delivery layer and resources layer. We can consider it is a dynamic model, so whose revision, modification and upgrade will be carried out periodically by the project group.

The four-layer models is shown in the following table, in which it´s included each aspect and concept considered in the four established:

FOUR-LAYER MODEL	
1- Administrative layer	- Admission Rules - Exams - Grading and Degree
2- Content layer	- Subject (scope) of Modules - Learning Goals - Level of Knowledge
3- Delivery layer	- Type of Lecture - Mode of Interaction - Learning Paradigm
4- Resource layer	- People - Infrastructure - Teaching Materials

Starting working from this four-layer model the project group has shared the brainstormings carried out by each participant (universities and external collaborators) in the Project Erasmus. The topics considered by each member are shown in the following chart :

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FOUR-LAYER MODEL	
1- Administrative layer	**Target group for the program:** - Prerequisites for admission - Admission control
	Modules and Duration: - 1-2 years program. - Number of credits: total, per year, per module. - Compulsory and optional modules - Specializations
	Postgraduate – graduate degrees
	Requirements for obtaining a degree: - Exams, credit points - Language - Degree signature
2- Content layer	**Educational Goal:** - Knowledge the students must have at the end of the program. - Training students to reach the job-position of …
	Modules and contents: - Compulsory modules - Optional modules - Specializations - Final Project or Work
3- Delivery layer	**Methods of course delivery:** - Presence-distance credits or modules - Electronic media - Business simulations - Field projects - Group work
	Type of lectures: - Seminars, - readings, - tutorials…
4- Resource layer	**Participating Institutions:** - involved universities - other institutions: State institutions, private institutions, logistics associations, companies,…
	Allocation of modules to the participating institutions - universities, infrastructure, …
	Teaching materials: - learning material - exercises, readings - case-studies - …

4. INDIVIDUAL BRAINSTORMINGS

4.1. CARDIFF'S GROUP BRAINSTORMING.
4.2. LJUBLJANA'S GROUP BRAINSTORMING.
4.3. CARTAGENA'S GROUP BRAINSTORMING.
4.4. MSS' GROUP BRAINSTORMING.

4.1. CARDIFF'S GROUP BRAINSTORMING.

Characteristics of the European MSc in Logistics Systems:

- A combination of face-to-face and e-Learning activities, but we do not envisage this being a distance learning course.
- Two year programme consisting of four compulsory modules in the first year. In year 2, the students would take three optional modules plus a problem solving module that brings together elements from the other modules (such as ILMG). They would then be expected to complete a dissertation.
- Each module carries equal credits. At the end of each module, students will obtain a certificate to show satisfactory attendance and learning. Students pay per module. Completing 8 modules enables you to obtain a diploma. Completing the dissertation satisfactorily entitles the student to a Masters degree.
- A price discount should be offered to students who complete the whole course (e.g. 4 modules for the price of 3, 7 for the price of 8, free dissertation supervision).
- Each university would teach one compulsory and one optional module, with teaching of the problem solving module split across all four partners.
- Cardiff University would be responsible for two modules. Module 1 (compulsory) – Logistics Modelling and Simulation. Module 2 (optional) – Operations and Supply Management.
- Typical content for Simulation module will include the Beer Game, Red-Blue Partnering Game, Discrete Event Simulation, Continuous and Discrete Modelling, Spreadsheet Modelling, Systems Thinking, Infrastructure Modelling. This module could be taught via two, three day blocks including evening activities. Module assessment as well as module documentation and exercises available through the Internet, enabling e-Learning.
- We believe other compulsory modules will focus on Finance/Economics, Logistics/Transport and Information and Communication Technology (ICT).
- Dissertations should be problem solving exercises (generic or empirical) rather than review based and ideally be based in the person's own organisation.
- Teaching will be enhanced through the use of case studies delivered by practitioners.
- Teaching would be carried out in blocks which could be varied according to the module (e.g. 2 blocks of 3 days, 3 blocks of 2 days etc). Total contact time per module would be approximately 44 hours.
- The students would come from industrial backgrounds and undertake the Masters on a part time basis.

4.2. LJUBLJANA'S GROUP BRAINSTORMING.

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At the present time the following modules we have been discussed and proposed are:

Lj. A: Mathematical background and modelling logistics systems.

- Logistics management, and the background and theory of supply chain management
- Logistics costs
- Transportation management
- Resource management, human resource management
- Information technology in logistics
- Aspects of economic evaluation methodology

Lj. B: Financing , taxation and insurance of risk in the global supply chains,

Lj. C: Strategic Logistics

- Location Theory
- Capacity Problems

Lj. D: Reverse Logistics

4.3. CARTAGENA'S GROUP BRAINSTORMING.

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Brainstorming Results:

- Master Course divided into Modules with Compulsory and Optional subjects:

    1) LOGISTICS
        a. Distribution and Transport.
        b. Production
        c. Procurement and Warehouse.
        d. Reverse and Green Logistics
        e. Human Resources

    2) ECONOMICS AND FINANCE
        a. Cash-Flow
        b. The Balance Sheet, and Profit and Loss Account

    3) INFORMATION SYSTEMS
        a. Telecommunications for Transport and Logistics Activities.
        b. New Technologies applied to Value Chain Management.
        c. Integrated Systems for Production Management and Logistics
        d. ERP Systems.

    4) QUANTITATIVE METHODS
        a. Inventory Models
        b. Queuing Theory
        c. Decision Making.
        d. Forecasting Techniques.

    5) TRANSPORT MANAGEMENT

- Proposal of optional subjects in order to define or establish " specializations " for similarity with the former studies.

- Degrees in the Master Course:
    o Course developed in two levels:
    o A first degree when finishing specific modules (first level)
    o A master Degree when finishing all compulsory modules and the final project (second level).

- Master Course : Two academic year programme
    o 4 month periods and a final Project to reach the degree.
    o Consider: a practical or training period in companies or researching related to the studied modules.

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- Credits per Module:
    - Compulsory subjects must be assigned a higher number of credits if exists directly relationship to Logistics.
    - Optional Subjects: Students must get a minimum number of credits, from different modules and universities. Or to study a complete module to get an specialization.
    - Final Project: a fixed number of credits .

- Each student will have assigned a tutor in the master course, and depending on his interest, objectives or job, he will develop the final Project, which will be directed by the appropriate teacher.
    - The tutor will belong to the university or country of the student's origin, and he will carry out the student's pursuit along the courses through personalized tutorships.
    - Final Project Supervising: personalized or through the TIC.

- Proposal of subjects in Cartagena's University:
    - Supply Chain and Reverse Logistics.
    - Supply Chain and Mathematical Models.
    - Human Resources Management in Logistics.
    - Logistics Networks: Design and Modelization.

- Methods of Course Delivery:
    - Compulsory and optional modules: presential classes, seminars, and working groups using communication technologies.
    - Practical Sessions, together with running a business game (ILMG).
    - Teaching Material:
        - The Project members must develop special material for the course: monographs, case-studies, ….

- Master Structure:

	Compulsory subjects	Optional subjects	Final project
1st cuatrim.	100%	---	---
2nd cuatrim.	50%	50%	---
3rd cuatrim.	50%	50%	---
4th cuatrim.		50%	50%
Final Project			100%

E-LEARNING: AN APPROACH

INTRODUCTION

In the last years, with the appearance of new information technologies, the code "e" has been used to talk about to all the activities related to computer science and electronic format.

Internet has revolutionized the distance education at all levels. It has appeared e-learning or virtual education, as a new way of learning, complementary to classroom teaching and as substitute of the present education.

E-learning has a lot of definitions, possibly because there isn't a single type of e-learning. A general definition shows the "learning" made by means of WEB technologies, or through an preinstalled software in a computer with multimedia capacity, either in an **asynchronic** way (separated student and source on time: auto-formation), or in a **synchronic** way (connected student and source in real time, a "*virtual class* ").

Traditionally distance education has been **asynchronic** (teacher and students learning in different places and in different times). The newness introduced with information and communication technologies (TIC) has brought the possibility of developing a **synchronic** formation, in which teachers and students listen, read and can be seen, independently if they are in different places.

E-learning is an auto- assisted learning system. The student will be able to assimilate knowledge, which "is dictated" by a program, by means of a computer. The student feels more comfortable and can repeat the lesson all the times he needed it.

The level reached by the student is evaluated through exams or tests. But formation through Internet presents several levels of complexity:

- Correspondence courses that use e-mail. The student receives books and he can communicate with the tutor via electronic mail.
- Formation improved by the Web: teacher develops web pages with links, as complement to the classes. This is an open and accessible modality that uses resources available in Internet: discussion forums, chats, forms, etc.
- e-learning Platforms: virtual learning environments, where students find necessary things to learn.

The principal characteristics of Formation through Internet are:

- Interactive
- Multimedia
- Open-system
- Intercultural Communication
- Multiplicity of Experts
- Control of the student of its learning
- Collaborative learning
- Online Evaluation

E-learning allows to form different formative scenes, If they are combined, it can provide a more significant learning:

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Type of learning	Tradicional Formation	E-Learning
Synchronic	Typical class in which it takes part a teacher and several students	All the class is connected to Internet in a Chat. The participants present ideas to the class using audio or text or videoconference.
Synchronic/ Asynchronic	Groups of students meet outside the class timetable to make some task	Groups of students meet in a Chat to make a propose task
	The teacher meets with students during tutorship hours	The teacher uses the tutorship hours to advise, in a chat, to students
Asynchronic	The students complete individually assigned tasks, making report for the teacher	The students download the tasks and resources of information from the Web site. The teacher provides to the student tutorship hours by e-mail
	The library is used as formation resource	The students have access to the excellent information of Internet through proposed connections.

VIRTUAL CLASSROOM

- Education and distance formation systems are not an education alternative more. They are an educative model of pedagogical innovation in the present century.

- The "face to face" education with students in specially designed spaces, "the classrooms", constitute their basic pieces. In the distance education modality, "the virtual classroom" is constituted in the new learning environment, and it's becoming a powerful device of communication and distribution of knowledge, which offers a "space" to take care of, guide and evaluate the participants.

- The virtual classroom , available in Internet the 24 hours of the day, offers all services and necessary functionalities to distance learning and gives meet

the educational necessity of teacher and students of a direct communication and immediate or deferred customized attention.

ADVANTAGES

The advantages to have an e-learning platform:

- Formation costs reduction.
- No physical space and displacements required.
- More possibilities for the people who are far from Formation Centres.
- Access to courses with flexible timetable.
- Learning and cooperative work environment.
- Information is distributed to all participants quickly.
- Students are prepared to compete in the market more agile, quickly and efficiently.
- This formation is complemented with the actual formation

DISADVANTAGES

- The design and development of a course by e-learning require more labour than actual courses.
- Teachers are required more effort, because they are going to receive different doubts from different students.
- It´s required a good instructional design.
- Human contact between students and professors missing.
- E-learning changes the habitual form to work in a course. This system requires self-discipline, regulation of the time, etc from the students.
- Abandon, as in other modalities of distance education, can reach a high level.

EVALUATION

It is important to remember that evaluation is considered the method of verification of assimilation of the contents, and it allow us "to guarantee the learning". However, many educators say that the evaluation demands a synchronous activity between

educators and students; but in the distance education this perception cannot be applied. For example, in the case of web pages, the situation presents some interesting dimensions: The Online evaluation can be made using active programming tools in Web, but we must remember that the permanence in front a monitor produces a decreasing level in attention and concentration, and at the moment of an evaluation the cybernauta student may escape of the evaluation disconnecting the device.

Thus, Educators must coordinate evaluations "Offline", where they can use a variety of evaluation instruments. The development of learning instruments can be made on line as much as out of line.

A valid alternative is to give the evaluation via Web, for its later downloading, and to give to the student the possibility of presenting its results through the same via.

FORMATION MODEL

Principals characteristics must have the proposed model of formation:

- E-learning must offer to the students varied options of INTERACTIVITY: interaction with other students, teachers, so with contents and activities of the course.

- E-learning must contribute to COLLABORATION between students, fomenting task groups, in which the students must use different synchronous and asynchronous tools to communicating.

- E-learning must incorporate special elements facilitating SIGNIFICANT LEARNING, using conceptual maps and case-studies.

- E-learning must promote the ACTIVE LEARNING by means of the development of individual and group tasks that the students to practical accomplishments lead.

- E-learning must promote a FORMATIVE EVALUATION of the students through different media.

- E-learning must promote a SYNCHRONOUS and ASYNCHRONOUS COMMUNICATION between teacher and students, so the students could find availability and faster answers to their doubts.

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STRUCTURE OF E-LEARNING PROGRAM

The students will be able to have the components that are described next :

- SCHEDULE: The schedule informs of new features in the course, new subjects incorporation, appointments for Chats, and information about activities' delivery.

- COMMUNICATIONS AREA:
  - o E-mail: students can communicate with teachers, tutors and other students.
  - o Chat: students and teachers can contact in real time.
  - o Forum: let students ask and answer about interesting questions.

- FORMATION AREA: Students find the different blocks that the program consists of. In each block the student will have access to the content of it, and later he will have to accede to the Activities' Mailbox, in which he will find the activities to develop. Students will be evaluated at the end of each block, and the overcoming of the evaluation is essential to accede and study the following blocks.

- RESOURCES AREA: For the course development, the student can use a wide variety of resources: :
  - o Examples of on-line courses
  - o Frequent questions
  - o Interesting links and web pages, …

4.4. MSS' GROUP BRAINSTORMING.

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Logistics is an increasingly important and quickly developing education and research area all over the world. At the same time, innovative computer supported solutions and approaches are currently under research and will more and more come into practice.

In the framework of postgraduate courses on Industrial Management, consisted of topics in Logistic Systems and Supply Chain Management as well as Industrial Management aspects at the Universidad Politécnica de Cartagena and in the framework of the European Uiversities, having Production and Inventory Modelling and Logistics in their Postgraduates studies, it is proposed that a commom European degree should be developed, also to be recognised by the European Logistics Associations. The programme will be extended and available to an increasing number of students and Universities.

In addition, students will be exposed to the problems of working in a multi-disciplinary field with multi-cultural environment including both group and individual tasks.

BACKGROUND

Logistics is a knowledge area of great importance for the whole Europe, even more when the international aspects inside and outside Europe are considered, with a rich development in training and research aspects on a world-wide scale This project focuses on the development of a common European Postgraduate Logistic Program at the Master level. Until now, different proposals of logistics programs for postgraduates have been introduced and developed in different European countries. In fact, both the University of Ljubljana and the Polytechnic University of Cartagena have established programs for PhD in Logistics. Also al LiTH (Linköping) there is a doctoral programme in Production Economics strongly featuring supply chains, multi-stage, multi-level production systems and other core elements of Logistics. Despite the great effort in the university environment there is still an international need to develop common programs and teaching criteria in Logistics. This aspect has been addressed by the European Logistics Association (ELA) through the training survey they have carried out in Europe.

The Universities involved in this project have been collaborating during the last years, with the main goal to develop common interest points like supply chain management, inventory modelling, etc. They are also involved in the development of e-learning bu designing and testing the International Logisticis Management Game. (ILMG). To design and then expand this proposal to other European Universities with the purpose of benefiting different groups in Europe is one of the main goals of this proposal. Even the students participating in the project will be also exposed to work with different European Countries. The four Universities are working together for the last three years, In March 2000, the First International Logistics Management Game Conference was launched in Cartagena,using software developed by staff from LiTH, afterwards, the

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Second and Third Conferences (2001-2002) have been organised by the University of Ljubljana.

OBJECTIVES

The goal of the present project is to develop a common postgraduate program that satisfies the local and general requirements of the Universities involved. The program will be discussed with the European Logistic Association, with the purpose of obtaining the "professional accreditation" of this professional international association, plus the four Universities involved in the project. It is important to take into account that the main goal of the present project is to analyse and design a Program in Logistic Systems. At the present time the following modules have been discussed and proposed:
· Logistics management, and the background and theory of supply chain management
· Logistics costs
· Transportation management
· Resource management, human resource management
· Information technology in logistics
  Aspects of economic evaluation methodology

Nevertheless the project partners have been discussing about the necessity to have a training structure that includes "compulsory" modules plus "optational" ones, which reflect the specific aspects of each country. The analysis of the actual training proposals of the different European Universities to identify the essential elements of the training and the specificity of the training are points of the general objective of this proposal. The university degree will be recognised by the four partipating universities in this proposal.

The design will be made under the guidelines of Bologna Convention. The real designing objective is to identify the guidelines which keep at the same common level, identifing the specificity or the particularity of each training programme offered. In this way, keeping to the plan defined by the process, it could well be implemented in other Universities. As part of the pedagogical material it will be use of modern information technology (TIC) in an extended way.

INNOVATION

The following aspects are innovations included in this proposal:
 - To have a Master Degree Agreement between four Universities in four European Countries together
 - To have a professional association accrediting the Master Degree
 - To be developed under the Bolonia convention
 - To have "core" modules plus "optational" (specific) modules
 - Extensive use of TIC, through:
                + WEB based exercises
                + Business games

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+ Distance learning

PEDAGOGICAL AND DIDACTICAL APPROACHES

After the different meetings and the work done by the participating universities until now, it seems quite clear the use of the different pedagogical approaches:
- Traditional lectures will be used for the presentation of basic concepts
- Small group seminars and tutorials
- "Case study analysis" for the students to work in group
- Business games, focusing on overall business logistics aspects, together with other business concepts.
- Economic evaluation methodology for the consequences of logistic decisions.
- Practical projects alone or in groups

The pedagogical approach will be supplemented with TIC support. For the aim it will be develop:
- Computer based learning material
- Design WEB based exercises
- Distance learning modules

Each of the four Universities will offer for the project the use of a computer lab (not financed), with Internet connectivity that allows the students to work together. Furthermore, the project will implement in each of them a videoconference application that allows the students to have distance learning modules from other of the partners involved in the project.

Also the consortium will develop pedagogical material together, and solutions to be used in a common way. As an example could be the students of one University playing against the others, in the frame provided by a Business Game, under the philosophy of internet.

TARGET GROUPS

The people interested in the present proposal is a large group with different interests as:
· Firstly, the Industrial Engineering and Management students, MSc in Logistics or similar. In this case, we will try to develop a common knowledge for all European Universities, allowing an excellent training of these future professionals.

· The professional associations in logistics, based on the European Logistic Association. It has been tested the training gap in logistics, related to the differences between countries or even between universities in the same country, which implies a great difficulty for establishing uniform criteria with consequences for what this fact means to the companies.

Other beneficiaries from the project will be the personnel working on logistic systems, they will have a common training reference among all the countries. At the present time, we have not developed any diffusion procedure, nevertheless, the Polytechnic

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University of Cartagena has developed a WEB on Logistics, in which could be incorporated, also in other professionals circles in Spain. Other partners have also shown their interest to promote the project in their countries.

The direct beneficiaries are the following:
- for Politechnic University of Cartagena: The students of Organización Industrial (around 120 students)
- for Linköping Institute of Technology: Students in the Master of Science Programme in Industrial Engineering (ca 200 students annually) and the International Master's Programme in Manufacturing Management(ca 30 students annually):
- for Ljubljana University: This University is redifining the programs with reference to Bologna convention, it means the students from Economic School and Maritime Studies School .
- for Cardiff University: Students at the Business School, around 100 students anually.
Also for the PhD students at the Politechnic University of Cartagena, at University of Ljubljana and at Linköping Institute of Technology.

However, once the program is designed, it will also be offered to other Universities, for example to implement a postgraduate program in logistics systems, the use of material and software, etc.