

## REZULTATI LLP- IRMA PROJEKTA OUTPUTS FROM LLP-IRMA PROJECT

Jozef NOVÁK MARCINČIN – Zsolt TIBA

**Sažetak:** Međunarodni project međuregionalnog istraživanja za napredak proizvodnje (IRMA) je orijentiran na izvođenje istraživanje/usporedba analize u 27 zemalja Europske zajednice s ciljem promoviranja izvrsnosti i iskoristivosti uputa u institucijama visokog obrazovanja. IRMA projekt istražuje proizvodno strojarstvo, uzimajući u obzir visoki stupanj inovativnosti i zahtjeve za brzim promjenama koje studenti moraju imati da bi se prilagodili i bili kompetentni na tržištu rada.

**Ključne riječi:**

- proizvodnja
- program cjeloživotnog obrazovanja
- istraživanje u proizvodnji

**Abstract:** The international project Inter-countries Research for Manufacturing Advancement (IRMA) is focused on the realization of a Research/Comparative Analysis in the 27 European Union's Member States, aimed at the promotion of excellence and efficiency of instruction in institutions of higher education. The IRMA project researches the Manufacturing Engineering field, taking into consideration its high level of innovation and rapidly changing requirements that students must possess, in order to adapt to and be competitive in the labour market.

**Keywords:**

- manufacturing
- lifelong learning program
- research in manufacturing

### 1. INTRODUCTION

The international project Inter-countries Research for Manufacturing Advancement (IRMA), co-financed within the Lifelong Learning Program, consists of the realisation of a 2-year program of Research-Comparative Analysis in the 27 European Union's Member States, aimed at promoting excellence, efficiency and fairness of instruction in institutions of higher education within the Manufacturing Engineering sector. The above sector was selected since it is supposed to contain a high level of innovation and quickly changing requirements that students should possess in order to adapt themselves and be competitive in the labour market.

The research analysis involves three interfaces: enterprises, universities, and "intermediary" institutions (incubators, technological poles, academic spin-offs, and institutional agencies). The analysis focuses on the following activities:

- to understand what competencies and knowledge are demanded by enterprises,
- to understand what competencies and knowledge are supplied by universities,
- to understand what competencies and knowledge are spread by intermediaries.

The duration of the IRMA Project is 24 months (01/01/2008 – 31/12/2009) and is carried out in the following phases:

- 1) Preparation and Design of Project ICT instruments.
- 2) Research Analysis Realisation.
- 3) Realization of Quality, Evaluation and Validation Plan.
- 4) Dissemination.
- 5) Exploitation.

The data are collected through a web questionnaire, specific for each of the three interfaces, and put in a database created on a portal. The following criteria are compared at the European level, as declared within the Project IRMA: qualitative and innovation level of teaching in higher education, quantitative level of students, causes/rate of scholastic defection, preventative action for scholastic defection, European mobility, occupational outlet, skills and competences management, obstacles to access/change/transfer to another faculty, e-learning services [1].

The analysis allows a detailed comparison among various universities that have the opportunity of exchanging the best practices and innovative elements existing in their own educational systems. The above-mentioned database including all gathered data through web questionnaires will be available on the Lifelong Learning Manufacturing Portal - LLMP. The Portal is used during the project's realisation and in particular after its completion, as a place where it is possible to communicate and to

exchange information and knowledge about manufacturing “open logic”.

## 2. PARTNERS IN THE IRMA PROJECT

### 2.1. Partner 1 - Project Applicant/Beneficiary: Faculty of Manufacturing Technologies TUKE

The Faculty of Manufacturing Technologies of the Technical University of Košice with a centre in Prešov was established on May the 1<sup>st</sup>, 1996 by the transformation of the Faculty of Professional Studies which was founded in 1992. The tradition of university technical education in Prešov started in 1979 when the branch of the Faculty of Mechanical Engineering of the University of Technology in Košice was founded. Based on the experience of the faculties of the University of Technology in Košice as the point of departure, the Faculty of Manufacturing Technologies has built up its position among the technically orientated faculties in Slovakia. The study branch entitled "Manufacturing Technology", which has been accredited, is the result of a gradual transformation from the technologies of mechanical engineering towards technologies covering the needs of the district of Prešov. Despite its short existence, the Faculty of Manufacturing Technologies has built up a firm position among the faculties of technical universities in Slovakia. More than 1,600 students study at the faculty in various fields of study and each year more than a hundred students graduate from the faculty [5].

The role of the Faculty of Manufacturing Technologies in the project includes: project strategy guidelines preparation (detailed planning) in English, a preparation proposal for detailed economic planning among partners, specification of equipment (purchased from the project budget), preparation of a draft analysis format proposal, establishment of a communications and administrative system, definition of requirements specifications for the LLP on manufacturing, and project management.

### 2.2. Partner 2 - Project Coordinator: Gruppo CS Torino (Italy)

Gruppo CS (CS Aziendale) is a small enterprise that belongs to Gruppo CS, a company that deals with consulting, education and training on a national and international level, through structures located in different Italian areas, including a local office abroad strategically situated in Bratislava. For over 20 years, Gruppo CS has been certified by ISO 9001:2000 standards, is active in the areas of industry, manufacturing, services, the third sector, construction, as well as the public sector. Gruppo CS has a team of highly experienced experts in different fields, who give steady attention to economic and industrial world news with the intent of acquiring information on all advances and technological

innovation in order to be able to provide added value to each individual factory system, according to specific needs. Gruppo CS constantly cooperates with the most important Italian and European Universities and also with important industrial groups. Gruppo CS training activities (traditional and distance learning) are the realization of: lifelong learning courses for employed persons of about 2000 companies of its consortium; higher education courses, projects and training activities in the field of technically advanced education and training courses realized in cooperation with intermediate schools, educational agencies and universities, European projects in various fields such as education, ICT, long distance work, etc.

The role of the Gruppo CS in the project consists of: management and coordination, TSCC meetings, preparation and design project ICT, research and analysis, quality, evaluation, validation, dissemination, exploitation.

### 2.3. Partner 3 – University of Oulu, Department of Industrial Engineering (Finland)

The University of Oulu is one of the largest universities in Finland with an exceptionally wide academic base. International pioneering research is conducted as a collaboration of different disciplines. The fields of information technology, biotechnology, northern and environmental issues have been defined as special research focus areas. The university cooperates closely with industry and commerce, and has broad connections with hundreds of international research and educational institutions. Six faculties and their departments form a multi-disciplinary academic community that enables diversified studies based on multifaceted research.

The role of the University of Oulu in the project consists of: participation in TSCC meetings, preparation and design project ICT, research and analysis, quality, evaluation, validation, dissemination, exploitation.

### 2.4. Partner 4 – Poznan University of Technology, Poznan (Poland)

The Poznan University of Technology is one of the top rated research and educational institutions in Poland. The Faculty of Mechanical Engineering and Management (FMEM) was established in 1974. Now it is one of 9 Faculties of the Poznan University of Technology. The FMEM mission is to provide graduate and undergraduate education and to conduct research in information and communication technologies. Innovation and breadth of opportunity are the hallmarks of the FMEM educational experience. Educational programs can be enrolled in on a full time basis. All available courses are designed to meet a variety of challenges by providing professional training in continual response to the diverse needs of the information age. The curriculum provides students with a

superb background for careers in an increasingly technological society.

The role of the Poznan University of Technology in the project is as follows: participation in TSCC meetings, preparation and design project ICT, research and analysis, quality, evaluation, validation, dissemination, exploitation [6].

#### **2.5. Partner 5 – North University of Baia Mare, Baia Mare (Romania)**

The Faculty of Engineering within the North University of Baia Mare has been in operation since 1990, and has been accredited since 1995; starting with the academic year 2005-2006 it has the following main domains (majors) in undergraduate studies: Industrial Engineering, Mechanical Engineering, Electrical Engineering, Energetic Engineering, Economic Engineering, Computers and Information Technology, and Electronics and Telecommunications. The Faculty coordinates the fundamental research activities, ensures the students' fundamental training in every major area of study, takes part in the higher education entrance examinations, and establishes research contracts with specialists from Romania and from abroad. It coordinates the entire activity of the students from the fields: MCT and PIE. It ensures the improvement of the curriculum for the two fields, coordinates scientific research activity within the two fields, suggests and supervises diploma projects for the two fields, and coordinates practical training and placement for the fields [2].

The role of the North University of Baia Mare in the project consists of: participation in TSCC meetings, preparation and design of the project ICT, research and analysis, quality, evaluation, validation, dissemination, and exploitation.

#### **2.6. Partner 6 – Baleares de Desarrollo y Formación, Palma (Spain)**

Baleares de Desarrollo y Formación, BDF, is an ICT research and development, training and consultancy company. BDF collaborates with organisations and institutions involved in R & D, adult education and training, employment etc., contributing to the building of the Knowledge Society by developing innovative adult education, lifelong learning, training and IT systems, programmes, products, services and methodologies. It conducts research in the fields of eLearning systems, methodologies and materials; equal opportunities and mainstreaming. It develops total ICT solutions for business and local government, e-commerce systems, eLearning systems and an eLearning centre. Design: corporate identity and graphic design. Consultancy: project development and management for business and institutions in the area of new technologies, facilitating

their adaptation to the information society; labour market entrance guidance; and entrepreneurship.

The role of the Baleares de Desarrollo y Formación in the project consists of: participation in TSCC meetings, preparation and design project ICT, research and analysis, quality, evaluation, validation, dissemination, exploitation.

#### **2.7. Partner 7 – Studio TEOS, Milan (Italy)**

Studio TEOS was founded in 1982. The three founders carried on activities of research for the University of Milan. Studio TEOS deals with projects and consulting in the ICT field with particular reference to Internet communication, e-Learning and workgroups, and has specific expertise and experience in: design and development of applications and portals that organize services and digital objects coming from distributed and heterogeneous repositories, use of new technologies in organizational processes and training systems, management of enhanced learning projects based on new technologies. Studio TEOS has experience in methods and integrated web solutions to manage and support human, organisational and relationship capital of networked enterprises in order to better exploit the value of intangible assets and intra-enterprise collaboration.

The role of Studio TEOS in the project consists of: participation in TSCC meetings, preparation and design of the project ICT, research and analysis, quality, evaluation, validation, dissemination, and exploitation.

#### **2.8. Partner 8 – CAD-Up International s.r.o. Prešov (Slovakia)**

CAD-Up International s.r.o. was founded in 1994. The main activities are oriented towards support for CAD/CAM/PLM products and engineering projects for machinery companies in Slovakia - especially for mould producers, special tools producers, CNC programs consumers and now furniture producers as well. From 1996, it is a non-exclusive distributor for CAD/CAM/PLM products from previous EDS, USA—now the UGS-The PLM Company, USA (Solid Edge, Unigraphics-NX, Teamcenter etc.) in Slovakia. The firm is well known among CAD/CAM users in the machinery and furniture industry, and among educational institutions for providing educational knowledge and skills surrounding e-learning and web-based courses both in Slovakia and the Czech Republic. The experienced sales and engineering teams provide support for all customers needs.

The role of the CAD-Up International s.r.o. (Prešov) in the project consists of: participation in TSCC meetings, preparation and design of the project ICT, research and analysis, quality control, evaluation, validation, dissemination, and development.

### 3. DESCRIPTION OF THE IRMA PROJECT

The IRMA project consists of the realization of Research/Comparative Analysis in the 27 European Union’s Member States. The objective of IRMA is the promotion of excellence, efficiency and fairness of instruction in institutions of higher education, or in other words, of student access and retention in higher education. In our opinion, excellence refers to the quality and to the level (or capacity) of innovation of the teaching system of higher education (contents, methods, technologies used, services provided to students, etc.), and efficiency is due to the correspondence among skills and competences provided by Universities and those required by enterprises and equity can be evaluated thanks to the equal opportunities given to students

independently from social, cultural, religious and economical factors.

The research is circumscribed to a specific field of manufacturing engineering, and is realized involving three interfaces: universities, enterprises and “intermediary” institutions (enterprise incubators, technological poles, academic spin-offs, and institutional agencies), with the purpose of understanding the competences and knowledge demanded from enterprises, which are competencies and knowledge supplied from universities and the competencies and knowledge spread from intermediaries [7].

The project aims at supporting the introduction of reforms in the educational and training systems and of improving investments in the human capital of universities, that is to say students, giving them new instruments and knowledge coherent with the competences demanded from the economy of knowledge,

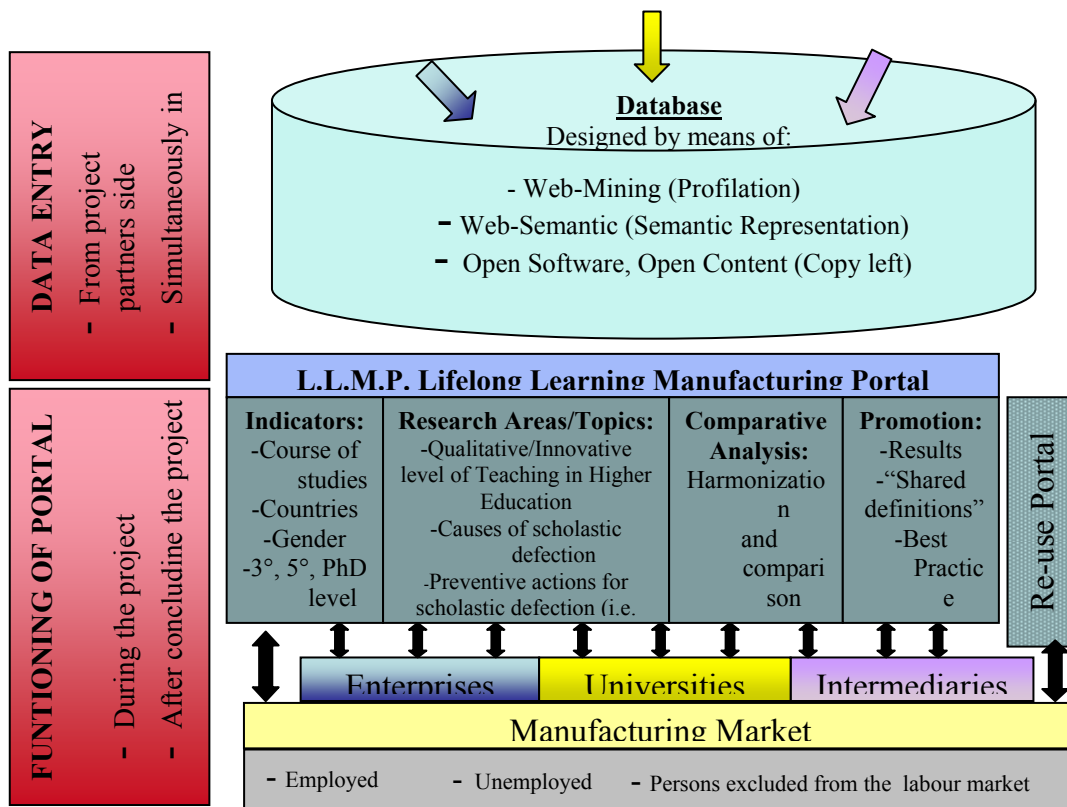


Figure.1 Principle of Lifelong Learning Manufacturing Portal (LLMP)

focusing on the state of the art in teaching manufacturing engineering in European universities.

The goal of the Inter-countries Research for Manufacturing Advancement (IRMA) project is, through research in manufacturing advancement education analysis: to analyze, accelerate and enhance the ability of the education sector to capitalise on the emergence of a

powerful information infrastructure in manufacturing advancement. The key components of the projects approach are:

- 1) through selected indicators to conduct research on the current status in education, research and training in manufacturing technologies,

- 2) to conduct research in manufacturing engineering advancement education based on a multilateral approach,
- 3) the use of a web-based multi-language platform to highlight the progress and results of increasing the visibility of the research;
- 4) manufacturing operation scheduling derived from the operation specifications.

Proposed research goals and methods can certainly be used to encourage education facilities and personnel to further explore topics on their own and take ownership of their learning and improve the overall procedures, goals and the system of education and also to encourage sharing of information and knowledge, and to secure the distribution of top of the line data on manufacturing advancement education through the network.

For instance, the excellence of Universities and their capacity to advance manufacturing technologies education could be analyzed/evaluated through the following topics of education conducted at educational facilities of interest [8]:

- Creative use of progressive tools for design phases using modern tools with elements of artificial intelligence as a strategic approach to implementation of modern technologies. It will include the software technologies (CAD/CAM/CAE/PDM/PLM); optimization of product design focused on price and manufacturing costs; cooperation and out-sourcing on product design; and modern CAPP systems and their implementation.
- Use of sophisticated approaches during the production phases focused on new methods in organization and management of manufacturing processes, ERP, MRP systems, logistics, innovation of manufacturing tools, and visualization of manufacturing management.
- Implementation of out-sourcing methods of manufacturing processes management. Out-sourcing decision-making processes. Implementation phases of out-sourcing management.
- Environmental impacts of cutting-edge manufacturing technologies. Environmental approaches of waste management.
- Nanotechnology in manufacturing processes. Development, testing and implementation of nanotechnology use in modern manufacturing processes focused on improvement of the manufacturing process effectiveness. Environmental impact and risks of nanotechnology use in manufacturing.

All the data are collected through a web questionnaire, specific for each of the three interfaces, and entered into a database created on the Lifelong Learning Manufacturing Portal (LLMP) that is used as a technological instrument to support the research.

The web-based platform allows for a direct connection between partners conducting research on modern

information on manufacturing advancement education, directly covering the whole network of partner and non-partner countries [6].

The manufacturing advancement education research is concentrated on analysis, processing, comparative analysis and distribution of the results up to the education personnel, decision makers and stakeholders. The project lifetime is underlined by the necessity of conducting research, analysis of the current status of manufacturing technologies education, interviews, distribution and analysis of the questionnaires and automatic data collection. The duration of the project is also dictated by the requirements of impact evaluation and analysis due to the predetermined period of time required to judge the outcome of the research results implementation as they are put into the practice.

#### 4. CONCLUSION

Inter-countries Research for Manufacturing Advancement will bring long-term advantages to manufacturing technologies education personnel and decision makers especially in high-quality learning content and applications which allow for the quick and profitable transfer of research results into practice. It will improve the quality of the manufacturing technologies educational system and its adaptability to the quickly changing requirements of the manufacturing industry in a broad area of knowledge and skills. Lifelong learning provides the advantage of skills improvement and enhancement which will certainly impact the abilities of educational systems to better fulfil assigned tasks. Manufacturing companies are globalizing and expanding worldwide and are outsourcing functions and activities with different requirements.

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Pregledni članak

Subject review

Authors address:

Prof. Ing. Jozef Novak-Marcinčin, PhD.

Technical University of Košice

Faculty of Manufacturing Technologies with a seat in Prešov, Bayerova 1, 08001 Prešov, SLOVAKIA

Prof. Dr. Ing. Zsolt Tiba

University of Debrecen

Faculty of Engineering, Otemeto Str. 2/4, Debrecen, HUNGARY