Knowledge Platform for Transferring Research and Innovation in Footwear Manufacturing

PROJECT 2015-1-RO01-KA203-015198
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Knowledge Platform for Transferring Research and Innovation in Footwear Manufacturing

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OUTPUT 1

Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing
OUTPUT 1: Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

Lead partner: P2-CEC
Partners: P1-TUIASI, P3-INCDTP, P4-TUC, P5-VC,
          P6-CTCP, P7-INESCOLP, P8-TTF, P9-CTD

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## CONTENT

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>1.1</td>
<td>Project objectives</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Aim and methodological aspects</td>
<td></td>
</tr>
<tr>
<td>Section A - OVERVIEW OF THE NATIONAL FOOTWEAR SECTOR</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>A.1.</td>
<td>Actual state and dynamics of the footwear sector</td>
<td></td>
</tr>
<tr>
<td>A.2.</td>
<td>Opportunities and constrains characterizing the footwear sector</td>
<td></td>
</tr>
<tr>
<td>A.3.</td>
<td>Needs for innovation and technological transfer in footwear companies. Study case of the Portuguese footwear industry</td>
<td></td>
</tr>
<tr>
<td>Section B - ANALYSIS OF THE EXISTING TRAINING AND/OR STUDY PROGRAMMES FOR HIGHLY QUALIFIED PROFESSIONALS</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>B.1.</td>
<td>Study programmes that address to the highly-qualified professionals</td>
<td></td>
</tr>
<tr>
<td>B.2.</td>
<td>Training courses for footwear industry addressing designers, managers and engineers/technicians</td>
<td></td>
</tr>
<tr>
<td>Section C - NEEDS FOR RESEARCH, DEVELOPMENT AND INNOVATION (RDI) IN FOOTWEAR SECTOR</td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>C.1.</td>
<td>Product-related innovation, including new materials and components</td>
<td></td>
</tr>
<tr>
<td>C.2.</td>
<td>Process innovation and emerging technologies for footwear manufacturing</td>
<td></td>
</tr>
<tr>
<td>C.3.</td>
<td>Organisational innovation including new business models</td>
<td></td>
</tr>
<tr>
<td>Section D - INVENTORY OF RESEARCH, DEVELOPMENT AND INNOVATION (RDI) PROJECTS</td>
<td></td>
<td>77</td>
</tr>
<tr>
<td>Section E - INVENTORY OF GOOD PRACTICES, PROJECTS AND INITIATIVES THAT DEMONSTRATE THE LINK AMONG UNIVERSITIES, RESEARCH CENTRES AND ENTERPRISES</td>
<td></td>
<td>81</td>
</tr>
<tr>
<td>Section F - FIELD RESEARCH</td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>F.1.</td>
<td>Planning and methodology</td>
<td></td>
</tr>
<tr>
<td>F.2.</td>
<td>Study on installed capacity to perform research, development and innovation in footwear manufacturing</td>
<td></td>
</tr>
<tr>
<td>F.3.</td>
<td>Study on skills for research, development and innovation in footwear manufacturing</td>
<td></td>
</tr>
<tr>
<td>REFERENCES</td>
<td></td>
<td>115</td>
</tr>
<tr>
<td>ANNEX 1 – Training and study programmes for highly qualified professionals: designers, managers and engineers/technicians</td>
<td></td>
<td>121</td>
</tr>
<tr>
<td>ANNEX 2 – Inventory of research, development and innovation (RDI) projects</td>
<td></td>
<td>153</td>
</tr>
<tr>
<td>ANNEX 3 - Inventory of good practices, projects and initiatives that demonstrate the link among universities, research centres and enterprises</td>
<td></td>
<td>167</td>
</tr>
<tr>
<td>ANNEX 4 - Questionnaires</td>
<td></td>
<td>191</td>
</tr>
</tbody>
</table>
PARTNERSHIP

P1  TUIASI-Gheorghe Asachi Technical University of Iasi
P2  CEC-European Confederation of the Footwear Industry
P3  INCDTP - Institutul National de Cercetare-Dezvoltare pentru Textile si Pielarie
P4  TUC-The Research Committee of the Technical University of Crete
P5  Virtual Campus Lda
P6  CTCP - Centro Tecnologico de Calzado de Portugal
P7  INESCOP-Instituto Tecnológico del Calzado y Conexas
P8  TTF-University of Zagreb/ Faculty of Textile Technology
P9  CTD-Creative Thinking Development
SUMMARY

The Knowledge4Foot project aims to contribute to foster the excellence in training for footwear manufacturing by linking the areas of Education, Research and Business in order to demonstrate good practices of cooperation and to bridge the worlds of education and work.

As part of this process, the consortium developed a study that provides a deep overview of the labour market needs for highly qualified professionals and identifies the MIX of transversal and professional skills that can boost the transfer of innovation coming from research into product, processes and services. The study presents the actual state of the footwear sector in Europe, the existing training options at different levels and, finally, the most relevant areas of innovation in the sector.
Actual state, opportunities and constraints of the footwear sector

Europe has a very long tradition in the production of footwear, a sector very sensitive to international challenges like globalisation. In the late nineties, many European companies opted for taking their production to low labour cost countries outside Europe, in particular to Asia. The recent economic and financial crisis also caused the closure of various companies and job losses. Fortunately, since then, the sector has become much stronger with growing employment figures reaching 290,000 direct jobs in 2015.

European footwear is distinguished for the excellent design, and quality of the products. However, in order to remain competitive, European companies need to build up an even higher capacity of innovation because added value comes from research in style and design, new materials and processes thanks to new technologies and Key Enabling Technologies, customisation, branding, high quality, new business models, digitalisation, sustainable development and environmental values. As such, the EU footwear sector requires highly qualified engineers, product & process developers, top and middle managers, etc. They should have the right mix of skills, both professional and transversal, in order to strengthen their competence for applied research, development and technological transfer.

However, the sector transformation and the adopted growth strategies are not homogeneous across Europe. Looking at some specific countries, it is worth to underline:

- The Spanish footwear sector is nowadays facing great structural changes. Among the main opportunities are the return of the production, the demand for smaller and quicker orders, the online distribution channel, the new design technologies and the appearance...
of emerging and niche markets. These changes imply advanced technological needs like graphical software, electronic circuitry, machinery, artificial vision, 3D digitalisation and the robotization of certain manufacturing processes.

- In Romania, footwear companies have applied different strategies to be present on the international market. Over the last decade, the Romanian footwear industry has registered a continuous technological growth with innovation in design, product and process development including computer aided manufacturing, new and innovative materials and footwear components, greater agility in response to market changes, awareness to sustainability and environmental issues.

- In Portugal, the footwear companies followed a strategy focused on the production of innovative and differentiated products targeted to niches or with high contents of fashion and design, improving the specialisation and consolidation of the closest markets. Portuguese industries focus on the main aspects that positively differentiate them and put them closer to the demand, such as fashion, design, flexibility, short time-to-market privileging the coverage of the whole product chain, creating, developing and manufacturing shoes.

- In Croatia, consistent growth and positive trends have seen in all business segments for the last few years. There are great opportunities in the footwear sector due to the increasingly significant green investments in recent years. However, the majority of employees in the leather processing industry still consist of unskilled and secondary education.
The European leather and footwear industry has proven to be very adaptable and able to hold through the crisis period by following strategies related to investment in development and technology, creating world recognizable brands and quality products and by targeting niche markets. The future is uncertain as are the political and economic external factors in today’s world, but the economic, demographic, social and cultural trends are important drivers for growth. For instance, the increase in consumption in emerging countries, the growing consumption power of the middle class, the increasing valorisation of differentiated added-value products, the fashion design and comfort, the answer to high performance requests for technical and professional footwear, the empowering and earning power of women looking for fashion, alert the industry for the need to evolve in innovation, quality, design fashion and shorter time-to-market production.

**Education and training for highly qualified professionals**

The study analysed training programmes at both non-tertiary (EQF 5) and tertiary level qualifications (EQF 6 and 7). Targeted qualifications were engineers and technicians, managers, designers and product developers. This analysis revealed details about the teaching topics/training modules whose objectives related to knowledge, skills and competences toward research, innovation and technological transfer. An ideal cross transversal profile has been defined for these graduates: to be able to work in teams, to communicate well, to analyse and synthesise, to be self-transformative, and to have reflective and critical abilities.
The number of courses at these levels is quite limited. There are five higher education courses in Spain, two in Romania and one in Croatia. In Portugal, there are no official study programmes at EQF level 6, 7, 8 (Bachelor, Master, postgraduate) and there is only one at level 5, Footwear Designer. In Greece, the organisation providing trained personnel to the sector stopped operating in mid-2011.

On the contrary, there are many short-term courses designed to qualify staff in specific occupations or operations. In some cases, these courses provide credits for a complete qualification within a sectoral profile. They are delivered through different pedagogical methods, such as e-learning or on-the-job training, and include multiple contents according to target-groups’ needs. Some examples of specialised training courses available in Europe are: Footwear functional analysis; Footwear certification; Microencapsulation in footwear; Size marking; Carbon footprint: environmental improvement for footwear; Non-slipping footwear; Antimicrobial agents; Efficacy in footwear; Footwear design; Storage, labelling & handling of chemical substances; Footwear quality control; Quality control laboratory tests; Shoe design with Adobe Photoshop or Illustrator; Understanding leather.

**Innovation in the Footwear sector**

Innovation in the sector takes place at different levels:

**Product innovation oriented to consumer’s needs:** This implies characterising the consumer’s attitude towards the footwear product in order to define more accurately its profile; orientating product management and development strategies towards understanding their
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015-1-RO01-KA203-015198

demands; integrating the ecological requirements into the product design, development and marketing; and finally, redefining the footwear product development methods.

The use of innovative materials or improved versions of those existing: Leather is a unique material due to its versatility; it is suitable for fashion, comfort, security and work footwear. Highly functional and environmental-safe leather is being developed. At the same time, smart and multifunctional materials have been created, combining the requirements of comfort shoes with the properties of highly functionalised materials. For instance, nanomaterials can improve the characteristics of the materials through innovative finishing effects of soles and components, increased strength, controlled thermal resistance, high absorbing capacity of sweat and its transformation into heat, self-cleaning footwear materials, others with flame retardant properties, health properties, such as wireless bio monitoring of vital functions and materials with antibacterial properties.

Innovation in design and engineering: To pursuit the acquisition of knowledge and development of skills on features related to health and comfort, biomechanics, etc. For instance, customized footwear and lasts prevent physical discomfort and foot deformation for the shoe wearer. New footwear components and devices give a great contribute to the shape and fitting for the use. Innovative solutions are being developed in order to increase the performance of footwear in every use, like anti-slip soles. New equipment for product engineering, from design to manufacturing, like footwear cutting systems, automatic systems for sole surface treatment, technology for differentiation, customisation and improvement in finished footwear, flexible storage solutions, automatic stitching machines and hybrid manufacturing systems.
INTRODUCTION

I.1. Project objectives

I.2. Methodological aspects
I.1 Project objectives

Knowledge4Foot project aims to foster the excellence in training for footwear manufacturing by linking the areas of Education, Research and Business therefore demonstrating good practices of cooperation and how they bridge the worlds of education and work.

More specifically, the project focuses on increasing the added value of European footwear by enhancing the research and development skills of workers. The project aims to create a curriculum and platform for internships/project-based learning, which will allow interns to transfer their acquired skills and knowledge to the footwear sector. For this purpose, the project includes the following activities:

1) To set-up a new Knowledge Platform for transferring research and innovation for footwear manufacturing where the students will receive project-based training into a virtual environment by simulating all developing stages of the research projects and having as starting point the real identified needs of leather and footwear companies;

2) To develop active collaboration among education, business community and research in order to assess the skills needs on innovation, research, development and technological transfer;

3) To design a common curriculum and related e-learning content which incorporates creative thinking, problem solving approach and project-based learning for virtual internship in a Knowledge Platform for transferring research and innovation?

Based on companies needs for training programmes for managers, engineers/technicians and designers in the footwear sector, the Knowledge4Foot project will contribute at developing sustainable solutions to attuning curricula for placement/internship in order to develop skills and competencies in area of project-based work focused on research, innovation and technological transfer. Thus, the project will have a significant impact on the development of education and training across Europe thanks to the development of an online platform that will collect all outputs and data compiled in this relation.
I.2 Methodological aspects

Aim of the study
The aims of the study titled “Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing” are:

- To provide a deep overview of the labour market needs for highly qualified professionals in footwear manufacturing
- To identify the MIX of transversal and professional skills that can boost the transfer of novelties coming from research and innovation into product, processes and services in order to increase the competitiveness of European footwear industry.

Topics
The study analyses how the project-based training is considered in existing Study Programmes of High Education (HE) students (EQF 5, 6 & 7) in partner countries (RO, ES, PT, HR and GR) in order to identify gaps and mismatches on skills & competences, and the needs of the labour market. In addition, several programmes from other European countries (IT, UK, DE, etc.) were investigated. In particular, the Output 1 addresses the following topics:

- Identification of needs, gaps and models for attuning the tertiary level training and study curricula in order to increase the relevance of the project-based training for research and innovation
- Initiatives and good practices for transferring knowledge, skills and competences among education, research and work environment for boosting the innovation in footwear manufacturing
Elaboration of the model for introducing virtual placements of students and trainees in research centres and enterprises

Common approach on integrating project-based training for footwear manufacturing in partner organisations.

Activities and role of the partners
The success of OUTPUT 1 requires the involvement of target groups and stakeholders from the project’s start. Therefore, all partners elaborated databases of their national stakeholders to be used for collecting the input data and the feedback as the project progresses. The overall working plan for OUTPUT 1 is:

Activity O1/A1. Assimilating the progress and guidelines achieved through European initiatives on new curricula needs

The partners P1-TUIASI, P6-CTCP and P7-INESCOP identified and analysed the reports and reference studies developed at the European level so that the structure of the study underlying this output reflects the latest trends in the training needs identified. Based on this analysis, partners P2- CEC and P1-TUIASI developed a Methodological Guide to orientate the research. The role of each partner in conducting this study was very clearly defined to avoid collecting the same type of data from multiple partners.

Activity O1/A2. Desk and field research on needs for project based training in footwear sector

Partners P2-CEC and P1-TUIASI have developed the methodology and proposed the model for structuring information in national reports. The identification of the challenges and discrepancies between the training needs of the footwear sector and the offer of university education / training programmes for this sector was done in two stages, namely by research in national and European sources ("desk research") and by research based on Questionnaires ("field research"). The partners P1-TUIASI (RO), P7- INESCOP (ES), P6-CTCP (PT), P4-TUC (GR), P8- TTF (HR) have completed their national reports.
The **Desk research** provides a state of the art to identify experiences and good practices in partner countries using various sources: studies, documents and curricula for Higher Education, national reports, statistics, other references etc.

Through **Field research**, stakeholders from partner countries have been involved and their inputs were collected via **questionnaires** applied to the following target groups: researchers, HE experts and academic staff, managers, engineers/technicians, designers, etc.

The partners involved in the survey were RO: P1-TUIASI, P3-INCDTP. EC: P7-INESCOP. PT: P6-CTCP. GR: P9-CTD. HR: P8-TTF. International: P2-CEC. Two types of questionnaires were designed, one to be applied to companies and one to be applied to experts from universities and research centers. The action of collecting the answers to the questionnaires was completed and the statistical analysis of the obtained results was carried out. 50 valid questionnaires were collected from experts from universities and research centres from a total of 23 entities (Romania - 12, Italy - 1, Croatia - 17, Greece - 7, Spain - 6, Portugal - 5, Turkey - 1, Republic of Moldova - 1) and 108 questionnaires from companies producing footwear (Romania - 25, Croatia - 10, Greece - 23, Spain - 23, Portugal - 12, UK-1, Germany-1, Poland- 6, Italy-1, Czech Republic-4, Slovenia-1, Sweden- 1).

**Activity O1/A3. Designing and producing the published version of the study**

The national reports from RO, GR, ES, PT, HR were merged according to the previous structure, and partners P5-Virtual Campus, P1-TUIASI and P2-CEC reviewed this report and transformed it into a unitary and coherent study for publication. Before releasing the final report (Aug2018), the study will be revised. This revision will consider the updates of several statistical figures related to the overview of the footwear industry in partner countries.

**Activity O1/A4. Disseminating the findings of the study among target groups, stakeholders and large public**

Each partner at national level and partner P2-CEC at European level performed the dissemination of this output among target groups, stakeholders and large public. This process continues for the entire period of the project as part of the Dissemination Plan.

**Activity O1/A5. Follow up.** Questionnaires were applied to relevant key stakeholders.
Quality Indicators

- Number of partners involved: 9 (3 universities, 3 research centres, 2 enterprises and 1 EU association) from 6 countries (RO, ES, PT, GR, HR, BE)
- Number of entities involved (universities, HE institutions, research & training centres, enterprises, associations, national accreditation bodies for HE, or research bodies, etc.) in various stages of O1 development, for inputs and for evaluation and validation of the outcome (others than the partner organisations): Proposed 60/ Realised Total 131: 108 companies and 23 Universities and Research centres.
- Number of relevant stakeholders (public authorities/bodies, ministries of education from participant countries and other national/ regional agency on education or employment, EU agencies and monitoring): Proposed 1 per partner country / Realised 6
- Number of experts reached through questionnaires: Proposed 120 (approximately 20 per country- the CEC will enlarge to other Member associations from Members non-represented among project partners)/ Realised Total 158: 108 experts from companies and 50 experts from HE & Research
- Geographical area of contacted entities: Proposed min. 12 EU countries (6 from partner countries and other 6 from EU countries outside the K4F consortium)/ Realised 14 countries: Romania, Spain, Greece, Portugal, Croatia, Sweden, Czech Republic, UK, Germany, Poland, Slovenia, Italy, Turkey, Rep. of Moldova.
- Relevance of the entities in the stated field- companies from footwear sector, universities and research centres
Section A

OVERVIEW OF THE FOOTWEAR SECTOR

A1. Actual state and dynamics of the footwear sector
A2. Opportunities and constrains characterising the footwear sector
A3. Needs for innovation and technological transfer in footwear companies
A1

Actual state and dynamics of the footwear sector

Europe has a very long tradition in the production of footwear, but this sector is very sensitive to international challenges represented by globalisation. In particular, in the late nineties, many European companies opted for bringing their production to low labour cost countries outside Europe, in particular to Asia. The latest economic and financial crisis also caused the closure of various companies and job losses. However, since then, the sector has managed to keep strong with employment figures.

The footwear worldwide production is estimated in 24.3 billion pairs of shoes and Europe is responsible for 3% of this figure. However, regarding exports, Europe is responsible for 11% of the global production in quantity, and there are 9 European countries in the top 15 of the most important exporters worldwide, namely Italy, Belgium, Germany, Spain, France, Portugal, UK, Romania and Slovakia.

In terms of value, Italy is on the 3rd position, among the top 15 countries, with 8.4% share.

Figure 1: World top 15 exporters in 2014, Source: World Footwear Yearbook 2015, www.worldfootwear.com
The post-crisis (2010-2016) yearly footwear statistical data (NACE code C152\(^1\)) in EU28 is presented in the next table. The data was collected from EUROSTAT - Prodcom Annual Data, [http://ec.europa.eu/eurostat/web/prodcom/data/excel-files-nace-rev.2](http://ec.europa.eu/eurostat/web/prodcom/data/excel-files-nace-rev.2) and the World Footwear Yearbook of APICCcaps. Except Greece, where the production continued to drop down, production in the other project partners’ countries, i.e. Spain, Portugal Romania and Croatia, have seen an increase on the number of manufactured pairs.

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<td>TOTAL EU28</td>
<td></td>
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<td></td>
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<tr>
<td>Number of companies</td>
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<td>19.700</td>
<td>19.000</td>
<td>19.000</td>
<td>19.237</td>
<td>19.282 (p)</td>
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<td>296.200</td>
<td>288.500</td>
<td>288.100</td>
<td>293.583</td>
<td>289.366 (p)</td>
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<td>Production (thousand pairs)</td>
<td>621.000</td>
<td>601.000</td>
<td>582.000</td>
<td>603.000</td>
<td>593.000</td>
<td>587.000</td>
<td>No data</td>
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<td>Gross production value (thousand €)</td>
<td>No data</td>
<td>24.309.000</td>
<td>24.014.000</td>
<td>24.686.000</td>
<td>26.000.000</td>
<td>26.000.000 (p)</td>
<td>No data</td>
</tr>
<tr>
<td>Exports to non-EU countries (thousand pairs)</td>
<td>1.406.044</td>
<td>1.564.685</td>
<td>1.508.031</td>
<td>1.639.088</td>
<td>1.808.196</td>
<td>1.738.037</td>
<td>1.801.279</td>
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\(^1\)Legend: The C152 NACE code includes:
15201100 Waterproof footwear, with uppers in rubber or plastics (excluding incorporating a protective metal toecap)
15201210 Sandals with rubber or plastic outer soles and uppers (including thong-type sandals, flip flops)
15201231 Town footwear with rubber or plastic uppers
15201380 Footwear with a wooden base and leather uppers (including clogs) (excluding with an inner sole or a protective metal toe-cap)
15201351 Men’s town footwear with leather uppers (including boots and shoes; excluding waterproof footwear, footwear with a protective metal toe-cap)
15201352 Women’s town footwear with leather uppers (including boots and shoes; excluding waterproof footwear, footwear with a protective metal toe-cap)
15201353 Children’s town footwear with leather uppers (including boots and shoes; excluding waterproof footwear, footwear with a protective metal toe-cap)
15201361 Men’s sandals with leather uppers (including thong-type sandals, flip flops)
15201362 Women’s sandals with leather uppers (including thong-type sandals, flip flops)
15201363 Children’s sandals with leather uppers (including thong-type sandals, flip flops)
15201370 Slippers and other indoor footwear with rubber or plastic outer soles and leather uppers (including dancing and bedroom slippers, mules)
15201380 Footwear with wood, cork or other outer soles and leather uppers (excluding outer soles of rubber, plastics or leather)
15201444 Slippers and other indoor footwear (excluding dancing and bedroom slippers, mules) 15201445 Footwear with rubber, plastic or leather outer soles and textile uppers (excluding slippers and other indoor footwear, sports footwear)
15201446 Footwear with textile uppers (excluding slippers and other indoor footwear as well as footwear with outer soles of rubber, plastics, leather or composition leather)
15202100 Sports footwear with rubber or plastic outer soles and textile uppers (including tennis shoes, basketball shoes, gym shoes, training shoes and the like)
15202900 Other sports footwear, except snow-ski footwear and skating boots
15203120 Footwear (including waterproof footwear), incorporating a protective metal toecap, with outer soles and uppers of rubber or of plastics
15203150 Footwear with rubber, plastic or leather outer soles and leather uppers, and with a protective metal toe-cap
15203200 Wooden footwear, miscellaneous special footwear and other footwear n.e.c.
15204020 Leather uppers and parts thereof of footwear (excluding stiffeners)
European footwear is distinguished for the excellent design, and high quality of the product. However, in order to remain competitive, European companies need to build up a higher capacity of innovation. They have to make important changes by adding value to their products. Moreover, the added value comes from research and innovation in terms of style and design, new materials and processes thanks to new technologies and Key Enabling Technologies, customisation, branding, high quality, new business models, digitalisation, sustainable development and environmental values. The 2014 study report titled *European Footwear Sector- Structure, Social Dialogue, Future*\(^2\), elaborated by the European social partners, CEC and IndustriALL Europe, provide a very accurate SWOT analysis of the European footwear sector. Among the weaknesses, this analysis underlines the ‘lack of real coordination between research centres and factories’, but in the same time, among the opportunities it identifies one certain direction, namely ‘more focused research and development’.

The current challenges of the EU footwear sector require highly qualified engineers, product & process developers, top and middle managers. They should have the right mix of skills, both professional and transversal, in order to demonstrate their competence for applied research, development and technological transfer. Making the knowledge triangle to work by connecting Higher Education, Research and Business for reaching the excellence is one of the goals of the EU policies and national political priorities in all EU 28 countries\(^3\).

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\(^3\)Source: Supporting growth and jobs – An agenda for the modernization of Europe’s higher education systems COM (2011) 567 final
According to the latest official employment statistics, the number of firms and production level grew in 2015. The sector made up of slightly more than 1,900 companies that directly employed more than 30,000 workers. Production represented a value of 3.1 million Euros and 105 million pairs.

### Table 2. Evolution of general data from the footwear sector in Spain

[Source: EUROSTAT] and World Footwear Yearbook of APICCAPS

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<tbody>
<tr>
<td>Number of companies</td>
<td>2,578</td>
<td>2,444</td>
<td>2,357</td>
<td>1,967</td>
<td>1,911</td>
<td>1,931 (p)</td>
<td>No data</td>
</tr>
<tr>
<td>Number of employees</td>
<td>24,067</td>
<td>25,471</td>
<td>24,065</td>
<td>26,409</td>
<td>29,493</td>
<td>30,861 (p)</td>
<td>No data</td>
</tr>
<tr>
<td>Production (thousand pairs)</td>
<td>95,000</td>
<td>94,000</td>
<td>97,000</td>
<td>92,000</td>
<td>102,000</td>
<td>105,000</td>
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</tr>
<tr>
<td>Gross production value (thousand €)</td>
<td>2,766,700</td>
<td>2,976,400</td>
<td>2,492,500</td>
<td>2,730,800</td>
<td>3,098,300</td>
<td>3,109,100 (p)</td>
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</tr>
<tr>
<td>Exports (thousand pairs)</td>
<td>112,273</td>
<td>138,457</td>
<td>141,247</td>
<td>140,469</td>
<td>157,892</td>
<td>148,774</td>
<td>160,125</td>
</tr>
<tr>
<td>Exports (thousand €)</td>
<td>1,820,063</td>
<td>2,089,125</td>
<td>2,096,172</td>
<td>2,291,694</td>
<td>2,634,719</td>
<td>2,518,361</td>
<td>2,655,117</td>
</tr>
<tr>
<td>Imports (thousand pairs)</td>
<td>380,311</td>
<td>355,333</td>
<td>321,258</td>
<td>328,161</td>
<td>319,014</td>
<td>283,839</td>
<td>293,829</td>
</tr>
<tr>
<td>Imports (thousand €)</td>
<td>2,100,141</td>
<td>2,158,036</td>
<td>2,090,837</td>
<td>2,080,261</td>
<td>2,414,189</td>
<td>2,691,593</td>
<td>2,848,225</td>
</tr>
</tbody>
</table>

The industrial structure shows that more than 96% of firms employed less than 50 workers. Most employment was in firms with between 20 and 49 workers, representing 41% of the total
employment. The rise in the Spanish production since 2010/2011 seems to have consolidated in the latest years with an annual variation of nearly 10% in its value.

With respect to trade, essential to the Spanish footwear industry, in 2016 the exports represented 2.655 million Euros and more than 160.125 thousands pairs. Nevertheless, a slowdown in the export growth is a fact, mimicking the general trade trend. On the other hand, imports have fallen in 2016 in terms of volume at 293.829 thousands pairs and risen in value at more than 2.848 million euro, comparing with the reference year of 2010. That is, Spain is importing a higher value product.

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Portugal

Portuguese footwear industry is one of the most innovative and modern industry, associated to an image of quality, design and innovation with the second highest price for exportation, worldwide. The success of the industry over the years is the result of the coherent and articulated work of all agents in place namely companies, employers’ association, training/education and scientific/technologic institutes who contribute together toward strategic objectives, planning actions and providing resources to cope with obstacles, while facilitating opportunities.

The defined strategy focused on a clustered pattern in the North of the country aggregates the whole industry and is based on a structure, whose importance is recognised at national and international level, and includes:

- the companies themselves – 1.133 footwear companies in 2015 with more than 47.000 employees,
• the nation-wide employers’ association founded in 1975 which promotes the development of the sectors it represents and those of its 700 members,
• the technological centre, a private non-profit research institute which support all the chain providing a wide range of services including consultancy, training, research and Development, Quality control among others, from 30 years now
• the vocational training centre, public institute connected to the public employment and training

The two last decades were profoundly difficult to the Portuguese Footwear industry, as well as in general for the entire European industry. Regardless of the difficulties felt all over Europe with serious repercussions at national level, footwear always managed to keep the numbers of exportations balanced and always stood up among the other sectors of economy.

The table below contains data concerning Portuguese Footwear industry (2010-2015/ partially 2016) in terms of statistical data. The years selected represent the most important moments of the industry as a reaction to the opportunities or difficulties felt in the past decade.

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</tr>
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<tbody>
<tr>
<td>Number of companies</td>
<td>1,321</td>
<td>1,274</td>
<td>1,177</td>
<td>1,157</td>
<td>1,102</td>
<td>1,133 (p)</td>
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<tr>
<td>Number of employees</td>
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<td>41,139</td>
<td>41,946</td>
<td>43,947</td>
<td>46,140</td>
<td>47,361 (p)</td>
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<td>Production (thousand pairs)</td>
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<td>61,000</td>
<td>74,000</td>
<td>75,000</td>
<td>75,000</td>
<td>79,000</td>
<td>No data</td>
</tr>
<tr>
<td>Gross production value (thousand €)</td>
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<td>1,993,400</td>
<td>2,025,900</td>
<td>2,211,2</td>
<td>2,371,100</td>
<td>2,356,200 (p)</td>
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</tr>
<tr>
<td>Exports (thousand pairs)</td>
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<td>80,168</td>
<td>71,365</td>
<td>74,816</td>
<td>88,957</td>
<td>82,368</td>
<td>82,353</td>
</tr>
<tr>
<td>Exports (thousand €)</td>
<td>1,359,138</td>
<td>1,541,626</td>
<td>1,600,458</td>
<td>1,734,527</td>
<td>1,854,621</td>
<td>1,866,575</td>
<td>1,922,157</td>
</tr>
<tr>
<td>Imports (thousand pairs)</td>
<td>69,835</td>
<td>63,371</td>
<td>47,486</td>
<td>50,843</td>
<td>70,454</td>
<td>55,461</td>
<td>58,773</td>
</tr>
<tr>
<td>Imports (thousand €)</td>
<td>466,197</td>
<td>467,162</td>
<td>403,499</td>
<td>422,161</td>
<td>488,718</td>
<td>529,221</td>
<td>599,080</td>
</tr>
</tbody>
</table>

Table 3. Evolution of general data from the footwear sector in Portugal

[Source: EUROSTAT) and World Footwear Yearbook of APICCAPS]
Regarding the size of the companies, the majority of Portuguese footwear companies are small medium sized enterprises (SME), smaller than the average of the other manufacturing industries in Portugal. Most of them are family running companies that are established for a long time. Footwear is definitely a family business, whose companies, know-how and passion for shoes pass from generations to generations.

The strong geographic focus is also one of the most relevant features of the Portuguese Footwear industry, which facilitates the creation and maintenance of networks that work together in tied relationships for the success of the development strategy. Footwear industry is highly concentrated in two geographical areas of activity both in the north of Portugal. Combined, these six districts and their neighbouring counties represent about 85% of the employment in the sector. A smaller agglomeration of the footwear industry more specialised in technical/professional footwear is placed further to the South of Portugal.

Besides footwear production, the footwear cluster includes footwear component and leather goods industries and other relevant economic activities, which itinerary is very similar to the footwear one. With an average price of 25€/pair at the factory, Portugal occupies the second position in the footwear highest price worldwide ranking and this figure trends to increase. The industry is specialised in the leather footwear, which represents now about 77% of the exports.

Internationalisation and the openness to foreign markets are the crucial orientations of the Portuguese Footwear sector. The Portuguese footwear industry exports around 98% of its production. Europe altogether absorbs the majority of Portuguese footwear exports (91%). The exportations reached 1.922 million Euros in 2016, conversely to the importations that reached 599 million Euros. The industry’s external trade balance is the highest of any sector of the Portuguese economy reflecting the importance of footwear in the national economy.

New Portuguese brands are springing up which are being well succeeded abroad, but also internally and a closer approach of the industry and commercial activity is being more and more visible. The number of shops and other commercial controlled by the industry are now five times more than the
one in the last decade the double of wholesalers, being disclosing indicators of the progression of the footwear sector in the value chain.

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**Romania**

The footwear industry has sustained for the last decades the Romanian economy and it represents an important source for the economic growth. Leather and footwear industry in Romania had a significant development during 1965-1980, when the main investments were oriented toward equipment, systems and technologies. Productions levels of the 70s-80s were sized to meet domestic market needs and the surplus to be exported particularly in CMEA countries. After 1989, the Romanian leather and footwear industry has faced the biggest challenge in its history by entering in direct competition with products made worldwide. At the beginning of the transition to the market economy, technical and technological endowment of the footwear industry presented a gap of 15-20 years compared to the global performance.

As effect of the economic trends, an extensive and complex modernising process was triggered in Romanian leather and footwear industry in order to:

- change the old and inefficient technologies and equipment with the new and modern ones that could be easily adapted to market demands;
- adjust the production units in accordance with the requirements of new markets;
- restructure staff and correlate the number of employees with production capabilities according to the market demands for footwear products.

The Romanian footwear industry produced 54 million pairs in 2015, significant less comparing with the reference year of 2010 (66 million pairs), but significant larger in terms of gross production
value: from 772 million Euros in 2010 to 940 million Euros in 2015. Growth in terms of production volumes and average product price started in 2011. The same tendency is reflected in Exports, and in 2016 Romanian footwear industry registered exports of more than 926 million Euros.

The official statistical data demonstrate that Romania is an important pivot for the European footwear production. The particular evolution of the main indicators for footwear industry is given in the next table.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
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<td>Number of companies</td>
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<td>1.108</td>
<td>1.098</td>
<td>1.072</td>
<td>1.112</td>
<td>1.107</td>
<td>(p)</td>
</tr>
<tr>
<td>Number of employees</td>
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<td>56.444</td>
<td>54.600</td>
<td>53.270</td>
<td>52.591</td>
<td>49.723</td>
<td>(p)</td>
</tr>
<tr>
<td>Production (thousand pairs)</td>
<td>66.000</td>
<td>44.000</td>
<td>50.000</td>
<td>50.000</td>
<td>50.000</td>
<td>54.000</td>
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</tr>
<tr>
<td>Gross production value (thousand €)</td>
<td>772.300</td>
<td>903.700</td>
<td>870.600</td>
<td>906.700</td>
<td>949.300</td>
<td>940.800</td>
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<tr>
<td>Exports (thousand pairs)</td>
<td>57.978</td>
<td>57.375</td>
<td>51.190</td>
<td>52.675</td>
<td>57.267</td>
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</tr>
<tr>
<td>Exports (thousand €)</td>
<td>863.146</td>
<td>1.019.579</td>
<td>932.734</td>
<td>980.821</td>
<td>1.032.213</td>
<td>951.082</td>
<td>926.337</td>
</tr>
<tr>
<td>Imports (thousand pairs)</td>
<td>81.739</td>
<td>72.909</td>
<td>62.531</td>
<td>67.674</td>
<td>60.674</td>
<td>55.915</td>
<td>51.937</td>
</tr>
<tr>
<td>Imports (thousand €)</td>
<td>204.742</td>
<td>246.741</td>
<td>219.649</td>
<td>254.162</td>
<td>302.467</td>
<td>302.568</td>
<td>393.763</td>
</tr>
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</table>

Table 4. Evolution of general data from the footwear sector in Romania
(Source: EUROSTAT) and World Footwear Yearbook of APICCAPS

Between 2010 and 2016, Romania demonstrates a stable situation in terms of companies with around 1100 companies. In terms of employment, the Romanian footwear industry employed less in 2015 (49723 employees) comparing with 2011 (56 444 employees). However, the country is still the second country in Europe in terms of employees, after Italy, and the industry has a big potential if more investments took place in education and training of the workforce.
The Greek footwear sector, as most of the manufacturing sectors, faces severe problems, due to the lengthy recession period of the Greek economy. As a result, it shows a negative profile in most of the financial indices, like production, employment, exports, etc. Despite this recession, the main union of the Greek Shoe makers tend to agree that the sector still keeps a considerable know-how: it has been a long living sector and it remains within the important manufacturing sectors in Greece. They have suggested solutions and reach strategic objectives by 2020 in order to recover the sector, as most of the manufacturing sectors have done.

During the last six years the decrease in production was more than 50% and this has made many enterprises to stop their operations and reduce employment. As a result, the training in the sector has disappeared from the Greek Universities and Technological Educational institutes and it only remains a small part of the education for the textile and clothing sector. Public training organisations have closed and stopped operating. Only private schools show some presence and they serve the limited needs only in the area of Athens. A number of young designers have appeared, but they produce limited collections and outsource most of their production.

The Hellenic Association of Footwear manufacturers and exporters (ELSEVIE) constitutes the main representative body of the Greek footwear sector. Members of the association are the 95 largest companies of the industry, responsible for almost the whole volume of Greek production and exports.

According to the statistics, the Greek Footwear Industry is represented by:

- Around 2% of the European footwear enterprises were located in Greece,
- There were 371 footwear enterprises in Greece in 2015, and this number is continuously decreasing.
- Footwear turnover remained nearly constant, between 2011 and 2013
• In terms of footwear employment, there were 1,665 people employed, and this number tends to remain constant, between 2012 and 2015, after a serious decrease in the first two years, from 2918 employees in 2009 to employees in 2010.

For the period of 2013-2014, the trend for the sector did not change. Footwear gross production value was down in 2015, and it is 34 % lower than 2010. In addition, in 2014, as evidenced by information from the banking sector, the liquidity of some companies in the sector dramatically worsened, and therefore their operation is questionable.

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</tr>
</thead>
<tbody>
<tr>
<td>Number of companies</td>
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<td>406</td>
<td>380</td>
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<td>369</td>
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<td>Number of employees</td>
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<td>2,009</td>
<td>1,594</td>
<td>1,622</td>
<td>1,708</td>
<td>1,665 (p)</td>
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</tr>
<tr>
<td>Production ( thousand pairs)</td>
<td>4,000</td>
<td>3,000</td>
<td>4,000</td>
<td>5,000</td>
<td>3,000</td>
<td>3,000</td>
<td>No data</td>
</tr>
<tr>
<td>Gross production value (thousand €)</td>
<td>169,700</td>
<td>103,500</td>
<td>86,600</td>
<td>72,500</td>
<td>60,700</td>
<td>57,700 (p)</td>
<td>No data</td>
</tr>
<tr>
<td>Exports (thousand pairs)</td>
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<td>10,942</td>
<td>10,422</td>
<td>11,857</td>
<td>14,064</td>
<td>20,827</td>
<td>32,564</td>
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<td>Exports (thousand €)</td>
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<td>59,787</td>
<td>51,818</td>
<td>55,906</td>
<td>63,023</td>
<td>70,952</td>
<td>102,162</td>
</tr>
<tr>
<td>Imports (thousand pairs)</td>
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<td>67,653</td>
<td>56,235</td>
<td>59,326</td>
<td>68,376</td>
<td>71,775</td>
<td>85,626</td>
</tr>
<tr>
<td>Imports (thousand €)</td>
<td>513,016</td>
<td>438,021</td>
<td>367,939</td>
<td>374,745</td>
<td>437,878</td>
<td>459,142</td>
<td>487,718</td>
</tr>
</tbody>
</table>

Table 5. Evolution of general data from the footwear sector in Greece
[Source: EUROSTAT) and World Footwear Yearbook of APICCAPS]
The leather industry (C15) includes activities in the processing of leather and manufacture of haberdashery and footwear. According to statistical data for 2015, the footwear companies in Croatia employed 5,809 workers in 102 companies, mainly SMEs.

The main products were tanned and finished leather, footwear and its parts, bags, suitcases and handbags. The tanning and footwear industry is well known as a traditional quality-manufacturing sector, with the most relevant trading partner in footwear being the EU market. The exports constantly increased year after year, from 5 million pairs in 2010 to 7.3 million pairs in 2016, but the most significant increase is in terms of value, from 120 million Euros in 2010 to 170 million Euro in 2016. During the period of 2010-2016, the dynamics of the statistical data is presented below.

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</tr>
</thead>
<tbody>
<tr>
<td>Number of companies</td>
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<td>125</td>
<td>117</td>
<td>120</td>
<td>104</td>
<td>102 (p)</td>
<td>No data</td>
</tr>
<tr>
<td>Number of employees</td>
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<td>5.820</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
<td>5.809 (p)</td>
<td>No data</td>
</tr>
<tr>
<td>Production ( thousand pairs)</td>
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<td>10.000</td>
<td>5.000</td>
<td>5.000</td>
<td>5.000</td>
<td>4.000</td>
<td></td>
</tr>
<tr>
<td>Gross production value (thousand €)</td>
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<td>95.000</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
<td></td>
</tr>
<tr>
<td>Exports (thousand €)</td>
<td>120.012</td>
<td>125.456</td>
<td>115.679</td>
<td>122.284</td>
<td>148.929</td>
<td>167.866</td>
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</tr>
<tr>
<td>Imports (thousand €)</td>
<td>142.951</td>
<td>150.581</td>
<td>147.779</td>
<td>157.991</td>
<td>185.581</td>
<td>215.886</td>
<td>239.433</td>
</tr>
</tbody>
</table>

*Table 6. Evolution of general data from the footwear sector in Croatia*

[Source: EUROSTAT) and World Footwear Yearbook of APICCAPS]
The footwear industry stakeholders from all over Europe have worked hard for decades managing to overcome many difficult periods and always counting on the industry’s entrepreneurs and the support entities, whose dynamism and innovative spirit has definitely confirmed the industry as having numerous strengths to face the constant challenges.

The Spanish footwear sector is nowadays facing great structural changes. Among the main opportunities one finds:

- the return of production,
- the demand for smaller and quicker orders,
- the online distribution channel,
- the new design technologies
- the appearance of emerging and niche markets.

Taking into account the firm size constraints and the national consumption slack, to best profit from the opportunities, the Spanish enterprises should promote long run sustainable growth, loyal clients, improved management, social and environmental respect, and attracting, training and retaining talent.

Spanish firms are being supported by the national footwear industry association through the implementation of its Strategic Plan 2016-2017 organised in 3 axes:

- Introduction of management systems for continuous improvement via lean management
techniques. The specific objective is the improvement of costs, productivity and response times.

- The need of deepening the digital transformation processes. This underlines the importance of the digital channel in brand positioning, in reinforcing sales points and in the analysis of consumer and consumption profiles.
- Growth processes through forums for internal management of human resources, and agreements for training intermediate position staff.

Beyond organisational and marketing innovations, the Spanish footwear sector has further technological needs. More specifically, the introduction of advanced technologies is necessary in topics such as graphical software, electronic circuits, machinery, artificial vision, three-dimensional digitalisation and/or robotisation of certain manufacturing processes.

In summary, the Spanish sector’s main objective is to continue to grow, recovering its profitability with wide enough margins to continue investing in brands, distribution and technologies to create qualified employment.

The Romanian footwear sector is a dynamic industry where companies have applied different strategies in order to be present on the international market. For short term, the cheap labour costs comparing to the European average salary had certain advantage for Romanian companies. However, the dynamics of the minimum salary in footwear sector shows an increasing tendency, from 1425 lei⁴/319.79 euro in 2012 to 1884 lei⁵/423.85 euro in 2015. On the other hand, the footwear companies have to become more and more competitive to increase productivity, and ensure high-quality of the products.

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⁵ INDUSTRY STATISTICAL BULLETIN NR. 11 / 2015, available at http://www.insse.ro/cms/ro/content/buletine-statistice
The Romanian footwear industry sustains the national economy and contributes significantly to the Romanian GPD. Together with textile and clothing industry, these economic sectors bring around 4% from Gross Domestic Product (GDP) and represent around 22% from total exports from Romania.

The footwear industry is a complex sector, and the value flow is fragmented in the production phases where many actors are involved. Having a small and medium organisational structure (in 2013 were registered 1207 companies and 53,046 employees, with an average of 43,9 employees per entity), many companies do not have resources to introduce innovation and research as strategic objectives for a sustainable development.

Over the last decade, the Romanian footwear industry has registered a continuous technological growth, mainly due to a “forced” technology modernisation because of the subcontracting production. However, innovation activities in design, product and process development including computer aided manufacturing, new and innovative materials and footwear components, a greater agility and response to market change, awareness to sustainability and environmental issues, represent new challenges for the dynamics of the footwear sector in Romania. In addition, several constrains coming from the market are observed, such as:

- demand for customised products, smaller and quicker orders,
- increasing consumers’ preference for online sales,
- greater request for innovative and sustainable footwear concepts.

The following SWOT analysis of the Romanian footwear industry is based on the National Strategy for Exports elaborated by the Ministry of Economy for 2014-2020. Even if Romanian footwear companies continue to remain competitive in terms of costs and human resources, significant vulnerabilities still occur: business environment, lack of managerial skills, low level of

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7 Ofileanu D., Romanian footwear industry - evolutions and characteristics, in Annals of the „Constantin Brâncuși” University of Târgu Jiu, Economy Series, Issue 6/2014

Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**PROJECT 2015-1-RO01-KA203-015198**

Competitiveness coming from innovation, research and technological transfer, new business models and agile manufacturing, design and fashion end top brands.

### STRENGTHS

- Cultural diversity demonstrated by national traditions and individual creativity, which are suitable for creative industries, as footwear industry.
- Traditions in leather and footwear manufacturing
- Presence of engineers and technicians, speaking English or other languages, well trained, in the field of footwear manufacturing.
- Technical Higher Education system developed in the field of footwear manufacturing
- Footwear companies are still attractive for manufacturing outsourcing contracts BPO (business process outsourcing) and near shoring

### WEAKNESSES

- Lack of recognised footwear brands. Very few companies export own brand on international markets;
- Labour productivity in footwear companies is lower comparing with other EU countries
- Technological gap overall in comparison with other countries producing footwear
- Need for coordination at the sectoral level to increase the innovative competitiveness in footwear sector
- Low use of information technology in current activities of the footwear companies;
- Lack of entrepreneurial attitudes and practices adapted to new business models

### OPPORTUNITIES

- High level of technology transfer facilitated by national development strategies, in particular those relating to the infrastructure
- Investments funded by structural funds on priority axes of competitiveness, including measures of innovation, research and technology transfer
- Development of exports as a result of increasing demand for innovative footwear products
- Increasing demand for Romanian footwear as component of the “made in EU” trade label
- The expansion of electronic commerce and electronic business in the field of footwear manufacturing
- Development of networking and partnerships into new business models to be applied in footwear companies

### THREATS

- The passive attitude of the workforce and managers for needs of qualifications and continuous education in new emerging professions
- High dependence on foreign investors’ decision to re-locate the footwear companies in other countries
- Development of competition among brands and other intangible assets
- Imports from non-EU MSs, especially from the ones where investments and exports are subsidised and there are barriers to imports
- Tendency of Romanian companies to produce footwear with low added value
As the entire European footwear sector, Portuguese footwear companies followed a survival strategy very focused on the production of innovative and differentiated products targeted to niches or with high contents of fashion and design, improving the specialisation and consolidation in the closest markets. Strategies included:

- Some companies have bet on the production and sales of their own brands promoting innovative collections and marketing campaigns;
- Other companies have bet on the development of fashioned collection and have outsourced the manufacturing for the low-level products allowing to focus on the commercialisation – this is the most encountered model all-over Europe;
- Many companies have bet on the production of technical and high performance footwear in terms of comfort, security, professional and targeted to specific activities whether of leisure (golf, fishery, horse-riding etc.) or sports. This strategy implies a constant up skill in order to be updated;
- A significant number of companies is betting on the production for “private labels”, mainly small orders of high-end models, using their flexibility, short-time-to market and technical capacity.

The challenges are very demanding for the industry. In a globalisation framework in constant mutation and highly competitive, Portuguese footwear has to continuously changed the paradigm regarding the markets and bet also in emergent markets, where the earning of living is increasing the demand for more exigent products, but the competition is now less strong, preparing itself for those challenges and opportunities with confidence and positivism.
Below a SWOT analysis of the Portuguese Footwear industry is included, clarifying all previously mentioned.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
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<tbody>
<tr>
<td>• Coherent cluster, including components, support services and installed capacity;</td>
<td>• Limited control of the value chain;</td>
</tr>
<tr>
<td>• Successful model of governance and experienced support entities;</td>
<td>• Limited proximity to the final user;</td>
</tr>
<tr>
<td>• Good reputation;</td>
<td>• Limited understanding and domain of fashion in certain types of footwear/materials and components comparing to other competitors;</td>
</tr>
<tr>
<td>• Know-how in terms of product engineering and manufacturing;</td>
<td>• Strong seasonality of the product with sales breaking in Spring/Summer footwear;</td>
</tr>
<tr>
<td>• Quick response and short time-to-market capacity;</td>
<td>• Small sized companies struggle to address resources to innovation and research;</td>
</tr>
<tr>
<td>• Capacity and experience in producing small and very small order;</td>
<td>• Excessive focus on European markets;</td>
</tr>
<tr>
<td>• Limited value of work, comparing to the other European countries;</td>
<td>• Still existing skills shortages and gaps, apart from the still low qualifications in the footwear sector.</td>
</tr>
<tr>
<td>• Competitiveness in the production of leather footwear, specially, autumn/winter, with higher added value;</td>
<td></td>
</tr>
<tr>
<td>• Strong exporting vocation including European markets and others out of Europe.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREATS</th>
</tr>
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<tbody>
<tr>
<td>• New business models regarding distribution and sales;</td>
<td>• Stagnated consumption in Europe;</td>
</tr>
<tr>
<td>• Increase of the consumption worldwide;</td>
<td>• Excessive stress upon the manufacturers by the stagnant markets;</td>
</tr>
<tr>
<td>• Spring up of niches markets, and other emergent markets, worldwide.</td>
<td>• Inexistence of the manufacturing renewal;</td>
</tr>
<tr>
<td></td>
<td>• Bet on high added value product manufacturing by new players;</td>
</tr>
<tr>
<td></td>
<td>• Raw material scarcity, especially leather.</td>
</tr>
</tbody>
</table>
The Greek consumer experienced further political and economic turmoil during 2015 as the socio-political environment in Greece was shaken again after the government reinitiated negotiations with its creditors about the future course of the Greek economy. Amid such turbulence and after several consecutive years of insecurity and austerity, it was only natural that shoe sales declined further. The majority of Greek consumers are reducing spending in expectation of a prolongation of the economic recession; while at the same time, they are attempting to save money wherever possible by turning to cheaper items and special offers when shopping, including when shopping for shoes. Within this climate, footwear saw a 13% drop in current value sales in 2015. Sales have already been massively reduced over the past seven years of economic recession.

In Greece, 80% of footwear companies are established in residential areas, which may inhibit the growth of these businesses, among other difficulties. It prevented them also from being modernised. Among the general constrains of the Greek economy, the footwear sector faces:

- Lack of business premises and creation of industrial space, where they can settle without the stress of eviction, where they can make any investment they want, since there would be no uncertainty of tomorrow in terms of housing.
- Lack of funding support specifically for the sector from governmental funds,
- Competition from larger enterprises, as most Greek firms are very small.
- Nearly 60% of the raw materials used are imported (resulting in higher prices.
- The whole concept of clustering is not supported and the sector remains fragmented.
- Lack of support for local exhibitions, exhibition centre and participation in foreign fairs and exhibitions.
In the following table, the competitive landscape of footwear market in Greece against several prospects is presented.

<table>
<thead>
<tr>
<th>COMPETITIVE LANDSCAPE</th>
<th>PROSPECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sportswear companies Nike Hellas and Adidas Hellas led value sales in footwear in Greece in 2015, with Nike claiming the top position with a 19% value share and Adidas following with a 14% value share. Each of these companies’ brands traditionally enjoy high consumer awareness and they both have very loyal consumers in Greece;</td>
<td>• Greek consumers remain generally conservative when spending money on footwear throughout the forecast period, especially in light of the continuing unstable economic environment that drives the trend towards abstinence and modesty when shopping for apparel and footwear.</td>
</tr>
<tr>
<td>• The increasing numbers of Greek people becoming involved in organised sporting activity was another key reason for the strong position of these players in footwear in 2015.</td>
<td>• The majority of the prevailing consumer trends in the country will continue being built around value-for-money options, while style trends are set to continue favouring simplicity and one-size-fits-all footwear designs.</td>
</tr>
<tr>
<td>• Footwear style trends in Greece have typically embraced the wearing of sports shoes for everyday activities that are not related to sport and this trend flourished throughout the recession, in line with the rising need for casual and comfort footwear.</td>
<td>• It is not easy for the new designers to find their way to the top but however, a good number of up-and-coming names are about to step into the spotlight.</td>
</tr>
<tr>
<td>• In addition to the already existing tourism businesses, there is a tendency for young designers to design classic sandals inspired by the architecture, shapes and motifs used by the ancient Greeks. This led to the creation of successful brands, which sell in Greece and abroad.</td>
<td></td>
</tr>
</tbody>
</table>
During the last few years, Croatia has seen consistent growth and positive trends in all business segments. There are great opportunities in footwear sector due to the increasingly significant green investments in recent years. The majority of employees in the leather processing industry consist of unskilled and secondary education, about 75% of the female workforce with an average age of 40 years.

Education at the Secondary and higher level is organised at Faculty of Textile Technology in Zagreb, where the leather and footwear modules of education are taught according to the Bologna process in Varaždin. This industry is mainly located in Međimurje and Varaždin, which have around 80% of total employment in the leather processing industry.

Croatian Chamber of Economy (HGK) is actively involved and helps entrepreneurs with all available resources for organising thematic conferences, where it is possible to collaborate by pooling and exchange ideas, and for companies to participate in fairs in foreign-markets.

Croatian Society of Leather and Footwear Manufacturers, HGK and TTF co-organise regional symposium 'Education of professional staff in the field of leather, footwear and accessories', introducing the problem of the lack of high school and university students interested in education in the field of leather processing and manufacturing leather to the public.

The leather and footwear industry has proven to be very adaptable and able to overcome the general economic crisis with the following strategies:

- Investment in development and technology and quality products successfully exported to the world markets
- Renown brands
- Targeting niche markets, such as special shoes for special purposes, orthopaedic shoes, children's shoes,
From a strategic point of view, Portugal has focused on the main aspects that positively differentiate the Footwear industry in Europe, and has aligned it with the demand, such as fashion, design, flexibility, short time-to-market privileging the coverage of the whole product chain, creating, developing and manufacturing shoes.

The future is of course uncertain but the economic, demographic, social and cultural trends are important drivers on how to act. The intensification of the consumption in emerging countries, the increasing middle class, the increasing in the valorisation of the combination between fashion design, comfort and sustainability, the exigent demand on specific features to respond to high performance at technical and professional footwear, the empowering of women in the society and earning power, looking for fashion and better fits did alert the industry for the need of evolving and anticipating in terms of quality, design fashion and short time-to-market. It’s anyway the intensification of the competitive dynamic variables that are used to address it.

The Portuguese Footwear Industry aims to achieve a significant progress in terms of its international recognition, establishing itself as a crucial worldwide reference in the leather footwear manufacturing by 2020. The international positioning of the Portuguese exports will be done through a strong focus on sophistication, creativity and with the reinforcement of the national productive structure, which will need to be sustainable and highly competitive, and be based on a combination knowledge and innovation. The footwear industry in Portugal aims to reach the high-end consumer who values design, fashion and innovation.
Future plans for a Portuguese competitive industry in 2020 include:

- To continue modernise the industry in terms of processes and skills
- To continue produce with higher average price, betting on high-end and specialised footwear
- To increase exports
- To increase productivity and value for work
- To increase exports
- To increase productivity and value for work
- To improve the competitive position of Portugal as a manufacturer of high-end leather and footwear
- To increase online sales.
- To continue investing in innovation, research and development;
- To motivate the talent and creativity in the profit of differentiation and innovation;
- To continue investing in the qualifications of the human capital.
- To continue investing in social responsibility and labour conditions promoting the footwear industry as an excellent sector to work in, among youngsters and society in general.

The strategy for 2014-2020 deepens and widens to new markets the strategy pursued in the previous period 2007-2013. The Portuguese Footwear Strategy Plan for 2014-2020 highlights 3 drivers to orientate the action of all stakeholders toward the competitiveness of the sector.

**TO INTERNATIONALISE AND COMMUNICATE - IMAGE AND PROMOTION**

In parallel with the international orientation of the sector, the renovation of the image, through bold promotional campaigns with outstanding slogans such as “Designed by the future” and “The sexiest industry in Europe” in the past, the sector has undertaken the following actions: i) continue the collective image campaign; ii) upgrade of the single companies image; iii) continue and reinforce the external promotion: the presence in international fairs, entrepreneurial missions, new markets prospective and amplification of the networks in foreign markets.

**TO QUALIFY AND REJUVENATE - SKILLS AND COMPETENCES**

The Strategic Plan for the Footwear Industry 2020 highlights the “Qualifications and Renew of companies and workforce” as one of the pillars to sustain the sector’ success. It is difficult to renew the sector in terms of human resources, whether by VET or intergenerational skills
transmission programmes – such as mentoring programmes – when, despite the actual positive image of the sector, youngsters and their families still show reluctance in pursuing a career in the footwear industry. The upgrade of the sector’s image and the individual companies’ image will be decisive in the capture of the youngsters’ interest on the sector.

People working in the footwear industry will have to upgrade the manufacturing skills, which are determinant for the sustainable growth of the sector. VET will be again a way to deal with the challenge of the resources qualification, regardless if they are already working in footwear companies or if they are newcomers.

The national productive structure should show, more than ever, flexibility, quick response to market demands and the ability to adapt the existing manufacturing capacity to high-standards of quality and innovation of products and services.

The actions to pursuit are the following: i) To attract and qualify the youngsters to the footwear industry; ii) To better prepare managers; iii) To Intensify and innovate the education/training for the design and fashion; iv) To develop actions of increasing/mobilising the entrepreneurship spirit toward the sector; v) To provide business intelligence to support the companies’ strategy definition. This will be made through the innovation in the programmes and renewal of the actual curricula, incorporating innovation features.

**TO INNOVATE - TECHNOLOGY TRENDS AND THEIR INFLUENCE IN THE SKILLS GAP/SHORTAGE**

The Portuguese footwear strategy focuses on differentiation and on the development of products of high performance in segments of high added value markets and niches. This line of action envisages the research and development of materials and components that potentiate the capacity of differentiation of the national companies.

It is a priority to follow up the research and development in nanotechnologies, biotechnologies, providing skills in the field of biomechanics, sustainability, alternative materials and adapted processes and equipment. It is important to understand the structure and characteristics of the materials and to adapt the manufacturing practices to take the most of them. The development in the field of ICT is also important to follow-up as it is changing the paradigm of manufacturing and doing businesses. It is important to understand their functioning and to adapt practices to introduce them in the business.
Section B

ANALYSIS OF THE TRAINING AND STUDY PROGRAMMES

for highly qualified professionals: designers, managers and engineers/technicians

B1. Study programmes for highly qualified professionals
B2. Training courses for footwear industry addressing designers, managers and engineers/technicians
The quality of learning and training programmes should be assessed not only according to the study curricula, but also taking into consideration the students’ or trainees’ involvement in different extracurricular activities, in order to adjust the study programmes to a problem-solving approach to learn, which is more suitable to industry needs. Equally, the study curricula and the other activities (research, industrial placement, volunteering etc.), which students/trainees should be motivated to participate at, contribute for graduating competent and multi-skilled professionals.

The hereby analysis was performed in order to reveal details about the teaching topics/training modules whose objectives are to enrich the students with Knowledge, Skills and Competence toward research, innovation and technological transfer. In particular, examples of good practices for topics/ training modules that include project based learning are presented. The study and training programmes for qualified professionals having both non-tertiary (EQF 5) and tertiary level qualifications (EQF 6 and 7) in partner countries were deeply analysed in order to understand the gap and mismatches of skills and competences for research and innovation in the footwear sector. The targeted qualifications are engineers and technicians, managers, designers and product developers. Partners analysed the curriculum of their own long-term study programmes (Bachelor, Master, postgraduate) addressed to the highly-qualified professionals: managers, designers & product developers, engineers & technicians. Detailed content of the subjects (units/modules) that include project-based training was provided. Also, examples of content for the graduation project were presented.

This section provides an overview of the study programmes for highly-qualified professionals in partner countries (Spain, Portugal, Romania, Greece and Croatia). ANNEX 1.1 gives the detailed description of each study programme identified in partner countries, among other several examples.
of study programmes (BSc or MSc) in other countries, such as UK, Germany, Italy). For each study programme, the following topics were identified:

1. Presentation of the study programme: mission and objectives, duration, entry requirements.
2. Key learning outcomes: Knowledge, Skills, and Competences
3. Course content: Modules and Units, Teaching methods, Contact hours (for teaching in class, for individual study, for internship, etc.), Assessment and validation based on accumulation of ETCS points.
4. Content (curricula) of the internship /placement training programme
5. Detailed content of the projects undertaken by students as part of various modules of the course or/as final graduation project.
6. Conclusions - Identified needs and gaps of the study programme

In terms of how the future HE students should look like, whatever is the technical and scientific field they graduate, an ideal cross transversal profile has been defined: he/she should be able to work in teams, to communicate well, to analyse and synthesise, to be self-transformative, to have reflective and critical abilities. The graduates need to be flexible and able to help the organisations/companies, in which they work after graduation, to address all rapid and continuous changes. Therefore, the training and study programmes must treat the student/trainee as intellectual performers rather than as a conforming audience⁹.

In Spain, students can follow study programmes that combine higher education, project-based learning, practical workshops and/or company internship:

- **Footwear and leather goods pattern engineering** (INESCOP)

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The Portuguese footwear industry currently employs almost 38,000 people (numbers of 2014) for a production of 75 million pairs. These figures demonstrate a growth of 18% and 21% respectively comparing to 2010, consolidating the importance of the footwear industry in the manufacturing sector in Portugal as well as the recovering of the sector itself but this time with concerns about productivity and reflecting the introduction of a certain level of technology combined with manpower.

Adult Education and Vocational Education Training has been one of the keys to achieve the objectives set out in the successive Strategic Plan for Portuguese Footwear Industry. The training/education targeted to youngsters is also a part of the strategy with some players in this field providing long curricula for youngsters after 9 years’ school (15-17 years old). However, there is a strong barrier to the success, because of the low attractiveness of the footwear sector to the younger population. The perception of low salaries and repetitive operations, which is not always true, connotes the Footwear industry, and the lack of attractiveness is observed all over Europe.

Education/Training offer goes from short duration courses provided by training entities oriented to the footwear sector, specifically designed for the upskill of employees in a specific field of action or
operation to long duration education and training programmes targeted to employed or unemployed people – adults or youngsters – willing to improve or to enter in the sector. The National Qualifications Agency (ANQEP), a public regulatory body that certifies the VET training offer, through the homologation of profiles and curricula and/or certification of the training entities, and manages the National Catalogue of Qualifications that includes the following qualifications, rules all the training:

- Footwear Manufacturing Operator – Level 2 EQF
- Footwear Manufacturing Technician – Level 4 EQF
- Technician of Footwear and Leather Goods Production Management – Level 4 EQF
- Technician of Footwear and Leather Goods Machines Maintenance – Level 4 EQF
- Footwear Patter Making Technician – Level 4 EQF
- Footwear Designer – Level 5 EQF

Although this offer is wide in terms of vocational education training, the same does not happen in terms of High education which is resumed to level 5 EQF Footwear Designer.

There is no official curriculum for High education/training study programmes EQF level 6, 7, 8 (Bachelor, Master, postgraduate) in Portugal, except the specialised technical courses, a post-secondary non-tertiary training/education modality EQF level 5, which is provided by consortia of vocational education schools and research centres with universities.

Normally these EQF level 5 courses last approximately 1 year and they are addressed to qualified youngsters with 12 years’ school or already professionals in place seeking to know more about footwear. Now, there is only one course related to footwear in the EQF 5 level, which is the Specialised Technician on Footwear Designer provided by University of Aveiro in cooperation with CFPIC. In addition, there is another school providing a Intensive Course on Footwear Design – Escola de Moda Gudi. University of Beira Interior and the VET school AFTEBI promotes some courses which, not being totally dedicated to footwear, are targeted to the TCLF industry (Textile, Clothing, Leather, Footwear), such as Auditing of Management System and Fashion Trade.
TUIASI University has a Bachelor study programme, titled *Footwear Design and Technology* that is followed by a Master programme with the same name. Both programmes provide highly qualified professionals for footwear industry in accordance with the requirements of the national occupational profile.

The mission of the *Footwear Design and Technology* Bachelor programme is to educate engineers for the footwear and leather goods industry, which will prove a high level of professional skills and will successfully integrate, both in small and large business, in the country and abroad. The overall objective is to provide and promote excellence in teaching and research, to train highly skilled human resources for Romanian footwear and leather goods industry. The programme, through general engineering knowledge and skills, ensures the competences for practicing as a footwear engineer. In accordance with the mission and the overall objective, this programme has set the following specific objectives:

- to demonstrate fundamental engineering and footwear knowledge in order to identify, test and analyse the main characteristics of raw materials used for footwear.
- to develop creative thinking and innovative spirit in order to create footwear products adapted to the dynamic requirements of markets and consumers.
- to develop skills for shoe design and pattern making, as well as manufacturing processes and associated technologies.
- to use CAD / CAM systems and dedicated software for solving specific tasks of footwear design and manufacture.
- to demonstrate skills in evaluation and quality assurance of footwear products, in relation to the corresponding technological processes.
- to develop managerial skills in planning, coordinating and monitoring footwear manufacturing systems.
The programme’s curriculum includes 62 disciplines with 3152 hours and is divided on 8 semesters of 14 weeks, with an average of 26 hours per week. The curriculum includes 12 basic courses with 546 hours, 27 engineering courses with 1220 hours, 18 specialised courses with 1246 hours and 5 complementary courses with 140 hours.

The curriculum’s courses are provided with practical applications (seminar, laboratory, project). The most important project is the diploma project, being allocated 60 hours in the final semester.

The **Advanced Footwear Design and Technology** Master programme is designed based on European models of similar study programmes and it includes the needs of the Romanian footwear companies. At the end of this programme, the graduates are able:

- to solve specific tasks in the footwear field.
- to apply methods and techniques for computer aided design and development of footwear products.
- To develop complex projects and to implement technological and advanced solutions for manufacturing of sport, protective and orthopaedic footwear.
- to use methods, concepts and applications for optimising and improving specific footwear products and processes.
- to develop, implement, manage and monitor projects, quality systems, and to apply marketing strategies in footwear industry.
- to solve complex multidisciplinary research tasks in order to develop innovative products and processes in the footwear industry.

Regarding training for footwear industry, ELKEDE, which was the organisation that provided training, stopped operating in middle of 2011. There is only one school specialised in handmade shoes, and it is considered as a Centre for Free Studies. It provides four modules of courses for shoe design and production and it takes about 35 to 50 students per year. The graduates are
trained mainly in design and customised fashion shoes and some of them are becoming quite successful, or they are interested in continuing their family business, (http://www.sxediasmosipodimaton.gr/index.html).

No company in the footwear sector has their own facilities for training. They always were getting their trained personnel from ELKEDE. The same is valid for the textile sector. They get their employees from the training schemes described above and they did not invest on in-house training.

Regarding qualifications and certification of qualifications, they do not distinguish between publicly offered qualifications. They do not use the European proposed system for the 8 levels of qualifications. Currently, there are some discussions, but it has not yet been established.

Officially, Footwear training is part of the Initial vocational training (ISCED level 4), and it is treated together with clothing, in a common course, Clothing and footwear design. The Initial Vocational Training Structure, duration and objectives are:

- Initial training is supervised by the Ministry of National Education and Religious Affairs.
- Initial training is provided chiefly by the Vocational Training Institutes (IEKs).

The public and private IEKs operate in the framework of the National System of Vocational Education and Training (ESEEEK) that was established in 1992 under the aegis of the Organisation for Vocational Education and Training (OEEK). There are also some IEKs under the supervision of other ministries and agencies, such as the Greek Manpower Employment Organisation (OAED).

The objective of the IEKs is to provide all types of vocational training, both initial and advanced, and to ensure that the students obtain the necessary qualifications by delivering scientific, technical, vocational and practical knowledge and by cultivating skills with a view to facilitating their occupational integration and their adaptation to the changing needs of the production process. Graduates of Unified Lyceum or older type of Lyceum and Technical Vocational Schools (TEEs) may enrol in the IEKs.
For holders of Unified Lyceum leaving certificates, training lasts four semesters. Each training year consists of two self-contained semesters (14 full weeks of training each semester). Holders of TEE (or TEL / Technical Vocational Lyceum) Cycle 2 certificates are admitted directly to the third semester of the IEK in their specialisation (total duration of study: one year) or they may choose another IEK specialisation, in which case they study for the regular four semesters. Certain IEKs have specific Departments, which also accept Gymnasium leavers aged over 18 who may study for up to two semesters.

Since the academic year of 2005/2006, Faculty of Textile Technology organises also the professional study *Textile Clothing and Footwear Technology* (TCFT-P) with the place of performance in the dislocated unit in the town of Varaždin, Northern Croatia. These courses are carried out in accordance with economic operators’ needs.

Northwest part of the Croatia is the strongest textile pool and it groups most of the companies from the leather, accessories and footwear industries, which indicates the great need for education of workforce. It emphasises the need to introduce additional programmes of lifelong learning precisely for sectors of textile and leather (T/L), which are in accord to the Strategy of development of Faculty of Textile Technology.

The academic title of Professional Bachelor engineer of the Textile, Clothing and Footwear Technology (bacc. ing. techn. text.) includes the following sections:

- Clothing technology
- Textile Technology - Chemical
- Textile Technology - Mechanical
- Footwear Technology
- Footwear Design
The design courses in TTF Footwear Design module are:

- Basic design footwear
- The design of the product of the skin
- Artistic Graphic Composition
- Visual design footwear
- Shoes and fashion accessories through history

The programme of study is important for growth employment in the region as there are relatively large numbers of successful companies who need skilled personnel in textile and footwear technology, which in Croatia can be educated only at the Faculty of Textile Technology.
Whether or not modularised, the short-term courses are designed to qualify the target-group in specific occupations or in some of the operations included in them, or simply integrated in a troubleshooting strategy of certain companies to improve the results of their work. If they are modularised, they provide credits for a complete qualification within a sectoral profile. If are not modularised and simply designed according to a diagnosis of training needs, they can be run according to multiple methodologies, such as e-learning, training-action, on-the-job training, and include multiple contents according, again, to the needs of the target-groups. Here we list some examples of specialised training courses that combine higher education, project-based learning, practical workshops and/or company internship. **ANNEX 1.2** presents the detailed description of each course.

<table>
<thead>
<tr>
<th>Short Course / Training program</th>
<th>Training Provider</th>
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<tbody>
<tr>
<td>Footwear functional analysis</td>
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<tr>
<td>Footwear certification</td>
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<tr>
<td>Microencapsulation in footwear</td>
<td>INESCOP-Instituto Tecnologico del Calzado y Conexas</td>
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<tr>
<td>Hotmelt adhesives</td>
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<tr>
<td>Coolhunting in footwear</td>
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<td>Size marking</td>
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<td>Carbon footprint: environmental improvement for footwear</td>
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<tr>
<td>Non-slipping footwear</td>
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<tr>
<td>Reach in footwear</td>
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<tr>
<td>Antimicrobial agents. Efficacy in footwear</td>
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</table>
### Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**PROJECT 2015-1-RO01-KA203-015198**

<table>
<thead>
<tr>
<th>FOOTWEAR DESIGN</th>
<th>LSD – The Lisbon School of Design</th>
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</thead>
<tbody>
<tr>
<td>Storage, labelling and handling of chemical substances</td>
<td>CTCP - Centro Tecnologico de Calcado de Portugal</td>
</tr>
<tr>
<td>Footwear quality control</td>
<td></td>
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<tr>
<td>Quality control laboratory tests</td>
<td></td>
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<thead>
<tr>
<th>Footwear expertise</th>
<th>The International Shoe Competence Center, ISC Germany</th>
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<tbody>
<tr>
<td>Shoe design with adobe Photoshop</td>
<td></td>
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<tr>
<td>Shoe design with adobe illustrator</td>
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<tr>
<th>Footwear summer school</th>
<th>University of the Arts London - London College of Fashion</th>
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<tbody>
<tr>
<td>Footwear design: intensive</td>
<td></td>
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<tr>
<td>Understanding leather</td>
<td></td>
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<tr>
<td>Starting your own footwear or accessories label</td>
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</tr>
</tbody>
</table>
Section C  Needs for Research, Development and Innovation (RDI) in footwear sector

C1. Product-related innovation, including new materials and components

C2. Process innovation and emerging technologies for footwear manufacturing

C3. Organisational innovation including new business models
C1  

Product-related innovation, including new materials and components

PRODUCT INNOVATION ORIENTED TO CONSUMER’S NEEDS

When people change, they adapt themselves by adjusting their needs (in an increasing or a decreasing way) to the new requirements. Under the generic name of requirements, we include cultural, social, technological or environment factors. Providing new design solutions may be discussed depending on the level of satisfying a particular need, so that the framework scheme for drawing up an efficient design goes through the following stages:

- Elimination of the old context;
- Creation of a new framework;
- Understanding the new relation that can be established between the consumer and product;
- Generation of the product concept based on the new relation.

The first thing a designer should think of when aiming at solving a product in terms of an efficient design would be “the elimination” of the old structure, of a previous concept. From now on, it is necessary to build a new representation frame, from different points of view.

Once the new context is established, the designer finds a balance between the consumer needs and the new product, turning these relations into the so-called “vision of the product”, based on the needs – expectations – desires of the consumer. The product features (functional and aesthetic) complete this framework.
The next step is to turn the product vision into conceptual solutions, which is, in fact, the innovation activity in itself. The product features, set at the stage of drawing up the “vision of product”, do not translate into creative solutions but offer the designer a working instrument for generalisations and analogies with other products from other fields. It is necessary to provide enough solutions/samples/prototypes to allow the visualisation of the marketable footwear. At the end, a design assessment process is required.

When carrying out product-related innovation activities, the following aspects are gradually emphasised:

- The degree of novelty of the product in comparison with other similar products on the market;
- The manner in which the innovative footwear complies with fashion trends, comfort and quality requirements, making it easier for consumer to make a decision;
- The extent to which the new designs correspond with the company’s image, anticipating the reaction of clients loyal to the trademark of the company and possibly drawing in other segments when launching the new products on the market;
- The economic effects triggered by manufacturing: costs of raw materials and auxiliary materials, manual labour costs; eventually the purchase price for consumer should be taken into account.

Further research objectives on product innovation oriented to consumers’ needs could be:\
- Characterising the consumer’s attitude towards the footwear product, in order to define more accurately its profile;

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• Orientating the product management and development strategies towards the direction of understanding the modern consumer requirements; integrating the ecological requirements into the product design, development and marketing.

• Re-defining the footwear product development methods from the perspective of the Modular Design (MD), design for manufacturing (DfM) and Quality Function Deployment (QFD) methods;

INNOVATIVE MATERIALS

• Innovative leather.
Leather is a unique material used in the footwear industry, due to its versatility; it is suitable for fashion, comfort, security as well as work and casual footwear among others. High functional and environmental performance leather is being developed, such as:

✓ Leather tanned with trivalent chromium minimising environment risks
✓ Lighter and more elastic leather for comfort footwear
✓ Leather with good thermal performances and resistance to water
✓ Leather with greater resistance to light

• Smart and multifunctional materials
The aim of combining the requirements for footwear comfort with the properties of highly functionalised materials frames into the research priorities at European level. Research studies on intelligent materials are signalled, mainly for the textile and clothing industry. Despite this, the application of the new smart materials into footwear structures is still developing, from both research and technological transfer point of views. New research directions should be taken in the field of smart and multifunctional materials for footwear by integrating consumer-imposed requirements in innovative product concepts.
Considering the diversity of materials composing a footwear product structure (leather, fabrics, knitting, non-woven, plain or film-covered, laminated, composites, rubbers, polymers etc.), the following topics bring a high level of innovation in the field:

- **Nanomaterials** are developed to exhibit novel characteristics compared to the same material without nanoscale features. Nanomaterials have the potential to add value to footwear products and to improve the quality of life. Through nanotechnologies the desired characteristics of the footwear materials can improve, such as:
  - Innovative finishing effects of soles and materials through specific surface treatments
  - Introduction of properties like increased strength, chemical reactivity or conductivity, controlled thermal resistance, high absorbing capacity of sweat and its transformation into heat, etc.
  - Footwear materials that could clean themselves, a desirable feature, especially for linings.
  - Materials for footwear having flame retardant properties
  - Introducing special functions for individuals with health needs, such as wireless bio monitoring of vital functions at a distance
  - Materials with antibacterial properties

- **Shape-memory materials** (SMMs) are featured by the ability to recover their original shape from a significant and seemingly plastic deformation when a particular stimulus is applied\textsuperscript{11}. These types of materials could provide optimal fitting to the dimensions of the foot. The footwear may be returned to its original form by heating it, while maintaining its initial properties\textsuperscript{12}.

Several examples of innovative materials and technologies to be used in the footwear industry are given bellow:


\textsuperscript{12}http://www.instantshoe.com/
ANTIMICROBIAL MATERIALS

The use of metal ions as antimicrobials is gaining momentum in different application fields, as is the case of coatings of inner surfaces of refrigerators, or medical dressings. In the footwear industry, however, they have recently started to be employed and there are still few studies assessing their efficacy in footwear components.

Metal ions boast a continuous and long lasting activity, with a clean and innocuous effect for other living beings. Their efficacy is dependent on certain parameters, such as concentration, type of microorganism and substrate, temperature, pH, humidity and oxygen levels. In order for them to be effective, they have to interact with the microorganism and penetrate into it to the inside of the cell through some metal carriers present in the membrane, and to compete with the latter for catchment places. As a result, the microorganism is no longer capable of growing and reproducing. This way, it is possible to prevent the development of pathogenic microorganisms, such as *Salmonella sp*, *Escherichia coli* and *Staphilococcus aureus*, among others.

The use of metal particles and semiconductors is being explored as an alternative to the development of antimicrobial leather as a physicochemical barrier against pathogenic microorganisms. In particular, silver particles have proved to be effective against antibiotic-resistant bacteria. The antimicrobial properties of silver are attributed to its high reactivity against proteins, producing structural changes to cell walls and nuclear membrane and causing inhibition and cell death. Additionally, it is claimed to show high reactivity to bacterial DNA, thus inhibiting replication.

One of the advantages of silver is that it is a broad-spectrum antimicrobial. Ionic silver destroys bacteria, fungi, viruses and protozoa, although it is less active against more resistant microorganisms (for example, spores). Moreover, some studies claim that it is very unlikely for microorganisms to develop any kind of resistance against treatment. Unlike other chemical disinfectants, it has a continuous and long-lasting activity that remains even after cleaning the treated product.
### MICROENCAPSULATION

Microencapsulation is an innovative technology that has gained ground in recent years due to its numerous advantages. It allows innovative and healthy products to be developed, which are adapted to the environment and the end user, with new performance and functionalities, based on the incorporation of new advanced materials. This new technology is mostly used for protection purposes, where the controlled release of a substance, in terms of time and place, is required. Therefore, microencapsulation technology allows conventional materials to be transformed into smart and/or multifunctional materials with new performance and, hence, higher added value.

In recent years, the **footwear industry** has been working on the development of active footwear that interacts with the foot and improves comfort and wellbeing. One of the most used techniques employed for this purpose is the microencapsulation of substances with aromatic, cosmetic and antimicrobial properties, among others, and their subsequent incorporation into footwear components in direct contact with the foot for most of the day (Sánchez-Navarro et al, 2013). When the shoes are worn, the microencapsulated active substances are released and provide the desired care, while their effect is extended over time.

There are currently numerous microencapsulation techniques available, and choosing the most suitable one for a given application is a complex decision where different parameters have to be taken into account, such as the end use and the active substance release method, the nature of the active substance to be encapsulated, the desired size, the shell material to be employed, etc. Having all these aspects in mind, it is possible to design the most suitable path for microencapsulating the desired substance. There is a wide range of shell materials commonly employed for the microencapsulation of active substances, including natural origin materials such as polysaccharides or lipids, synthetic polymers of different nature, and inorganic substances. However, polymeric materials are most used nowadays. One of the main drawbacks of using both natural and synthetic polymers is their low thermal and mechanical resistance when it comes to incorporating them into industrial processes for the production of materials or products, where they have to undergo highly demanding process stages. Therefore, microcapsules incorporated in a given material must meet certain thermal and mechanical resistance requirements relative to footwear manufacturing processes and consequently not every shell material is capable of withstanding them.
DESIGN AND ENGINEERING

- **New concepts of design and fashion** – it is important to pursue the acquisition of knowledge and development of skills on features related to **health and comfort, biomechanics, and fashion**; improperly fitted shoes can lead to physical discomfort for the wearer and has a great effect on its daily activities. Also during a human lifetime, depending on many factors such as work conditions, social status, education or health, feet can suffer different traumas that can lead to modifications of their anatomical structure that is reflected in various foot problems, such as: hallux valgus, hallux varus, hammer toes, flat foot, fractures and so on). The induced foot deformations caused by poorly fitted footwear are the main source of discomfort and pain\(^\text{13}\). It is widely accepted that foot comfort, while wearing a footwear product, is directly influenced by the shape and interior dimensions of the shoe, the materials’ properties, and the manufacturing technology. If the footwear does not maintain the anatomical structure and normal physiology of the foot, in time, it can be a contributing factor to progressing foot deformities\(^\text{14}\).

Footwear is more than a foot protective wrapper. Although it is sometimes described as the intersection between the environment and the human body, enabling movement and experimenting the world, it also has a strong influence on the social and emotional aspects of our lives\(^\text{15}\). Thereby, footwear has acquired different roles and has different meanings depending on the taste of individuals, on their national and professional identity, and on their social status\(^\text{16}\). The new footwear concepts have to meet the market requirements. For consumers, the level of comfort is prior to other shoe characteristics, followed closely by high demands on quality and fashion.

\(^\text{13}\) Shuping Xiong, Pressure perception on the foot and the mechanical properties of foot tissue during constrained standing among Chinese. PhD thesis, Hong Kong University of Science and Technology, Hong Kong, 2008;
Biomechanical studies have significantly progressed over the last years. There are various gait patterns with various human locomotion for each individual. When walking every step is slightly different from each other due to differences in parameters of gait, such as contact heel, speed, strength and effort, even while walking down the same type of ground. Both in dynamics and orthostatic balance, the efforts distributed on the foot apply strong stresses on the foot and body skeleton. This stress can be diminished by proper footwear, designed to keep the normal anatomic structure of the foot.

- **Customised footwear and lasts.** Besides the need of people with different feet disorders for custom-made footwear, people with healthy feet demand customisation more and more. Nowadays, customers do not only seek fashionable shoes, but they are also interested in quality, comfort and fitting. There is a trend among footwear producers to introduce customisation to satisfy varying styles, fit, and comfort needs, thus to increase the product’s added value. This increasing demand for custom-made footwear is determined by the fact that individuals have different values for foot dimensions like length, width, and girth. In addition, customers are getting more concerned about their health and are increasingly aware of the importance of footwear in the prevention of different health problems.

21 Shuping Xiong, Jianhui Zhao, Zuhua Jiang, Ming Don, A computer-aided design system for foot-feature-based shoe last customization, The International Journal of Advanced Manufacturing Technology, January 2010, Volume 46, Issue 1, pp 11-19;
While the foot is considered as the second “heart” of a human, transmitting and attenuating the impact forces between the ground and the human skeletal system\textsuperscript{22}, the shoe last is the hearth of footwear because it is the key component for manufacturing it. A shoe last is a form, made from wood or plastic that determines the inner dimensions of a shoe model and represents certain measurements and dimensions of a human foot. Dimensions and characteristics of lasts intended for mass production of footwear were determined in the past by averaging anthropometrical dimensions of the general human population. In addition, they have to comply with certain sizing standards for lengths and widths. There are different types of lasts, among which the most common ones are those used for trainers, shoes, boots, booties and sandals. Moreover, they can also be classified according to their intended use (women’s, men’s or children’s footwear) or toe shape (pointed, square, round, etc.)\textsuperscript{23}. Traditionally, custom shoe lasts are made manually, but this process is very time consuming. Nowadays, due to the rapid development of computer technologies, different advanced techniques have been developed\textsuperscript{24} for designing and manufacturing customised lasts\textsuperscript{25}.

- **New footwear components and devices.** Components in footwear greatly contribute to its shape and fitting for use. Innovative solutions are being developed in order to increase the performance of footwear in every use. Some examples are:
  - Insoles/in socks in polyurethane and cork with a high level of absorption and resilience
  - Soles made of biodegradable thermoplastic polyurethane

\textsuperscript{22}Luximon Ameersing, Foot shape evaluation for footwear fitting, PhD Thesis, Hong Kong University of Science and Technology, Hong Kong, 2001;
\textsuperscript{24}Mihai A., Costea M., Sarghie B., Creative Transfer of Competence in 3D Footwear CAD, in Proceeding of ICAMS 2014 – 5th International Conference on Advanced Materials and Systems, Bucharest, 2014;
\textsuperscript{25}Sarghie B., Costea M., Mihai A., 2013. 3D modelling of shoe lasts using templates based on anthropometrical measurements of the foot – case study. In Leather and Footwear Journal, 13, 3, ISSN 15834433, Pg. 221-234;
• Soles and insoles with specific requirements for certain target groups

An example for conducting research on anti-slip soles is given below:

### ANTI-SLIP SOLES

<table>
<thead>
<tr>
<th>Justification on the identified consumer’s need</th>
</tr>
</thead>
<tbody>
<tr>
<td>The European Agency for Safety and Health at Work (EU-OSHA) confirms that falls at the same level are the main cause of accidents in all sectors. This type of accident is estimated at 40% of the total, which is mainly attributed to slips (due to a low grip of the shoe on the floor) and trips (usually by an excessive grip of the shoe on the floor). This involves around 1.5 million working days lost annually, and a high cost associated with lost production and social and health costs. One of the measures to reduce the risk of such falls, is the use of footwear with non-slip surfaces.</td>
</tr>
</tbody>
</table>

Despite the great efforts made in many countries, and the progress on knowledge of the phenomenon of friction between footwear and floor, it has not been possible to solve all the problems related to the possibility of people slipping and falling while walking. There is great interest in this line of work because this is the largest single cause of injury and injury by accident, especially in the elderly.

The difficulty of addressing this problem lies largely in the high number of factors which determine the coefficient of friction, such as weight, speed, temperature, lubrication, topography and surface roughness of the pavement, type of shoe sole design, materials thereof, etc.

The most influential variables in the friction coefficient are as follows:

• **Sole materials.** The phenomenon of friction between a rigid surface and a shoe sole also depends on the resilience of the sole to the
rigid surface, especially in conditions of dry and clean surface.

- **Design of the sole.** Designs that are apparently similar when analysed in detail show slight differences that may cause changes in the behaviour of the shoe, always referring, of course, to the same material. There are basic recommendations for the design of the sole. They aim to increase the contact between the surfaces and the sole and to facilitate the evacuation of pollutants. A guide for not slipping shoes in standard test conditions for shoes is available (INESCOP).

- **Wear of the sole.** Wear can alter the design parameters that have been relevant for obtaining slip-resistant footwear, as well as the properties of hardness behaviour and overall dimensions of the sole, which are affected by chemical and environmental agents and shoe cleaning processes.

- **Pollutants.** Slip resistance depends on the presence of contaminants such as water or oil contaminated floors. They are the main cause of accidents due to slipping. The contaminant decreases the adhesion between ground-sole surfaces.

- **New practices and equipment on product engineering - CAD and Rapid Prototyping.** Given the increased, refined and specifically defined requirements of more and more consumers, the footwear industry had to resort to new solutions and equipment on product engineering. Thus, from design to manufacturing, footwear producers adopt specific software tools that can produce reliable prototypes in terms of fashion as well as design functional features, in shorter periods. Revolutionary CAD / CAM and Rapid prototyping systems are the next generation of engineering solutions for the footwear industry. The future product engineers

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must be skilled in operating with various equipment and practices, such as: 3D scanning and 3D modelling, 3D printing, and automatic analysis of forms\textsuperscript{27}.

The following example presents a fact sheet for a research project proposal where product-engineering tools like CAD and Rapid prototyping are used to develop an innovative footwear product having specific requirements from target groups

\begin{tabular}{|c|}
\hline
\textbf{Objective} \\
\hline
- To develop innovative concepts for comfortable footwear, functional components and inserts, which lead to increasing the customisation level in the case of individuals with high arched feet. \\
\hline
\textbf{Justification/State of the Art} \\
\hline
- The high arch problem is associated with foot pain caused by excessive pressure on bone structure: heel, ball and toe. The pressure, defined as a force spread over a surface area, could
\hline
\end{tabular}

cause pain if the footwear does not have a good design. Footwear, through its components, has to manage and control the dynamic characteristics of the foot and limb with biomechanics.

- Total contact inserts, combined with a heel-cup and arch-support devices may contribute to relieve heel and forefoot pressures, may attenuate impact forces, and offer better comfort (Yung-Hui L. & Wei-Hsien H., 2005).

- Different kinds of footwear, devices and inserts have certain favourable effects on gait pattern and on perceived comfort both for casual and therapeutic footwear, but no clear designing principles for their construction exist, little evidence is available to guide clinicians in the selection (Payne C. et.a., 2003), and there is partial confirmation of their efficiency (Burns J. et.a., 2006).

- The 3D foot scanning procedures, the new pressure measurements with computer techniques, as well as the CAD interactive software solutions which have been developed lately, allow for the reassessment of designing the footwear or footwear components, and also provide useful data for predicting the behaviour of the products under various stresses and conditions while walking (Rupérez M.J., 2010).

- The research undertaken within this project aims to study and to propose a complete solution for virtual prototyping (VP) of therapeutic footwear, inserts and orthotic devices by combining biomechanical data, which characterise the specific gait pattern for subjects having high arched feet, with data obtained through 3D foot scanning and 3D interactive modelling of the new last.

- Virtual prototypes for lasts, footwear and its components (sole,
insole, inserts) are obtained and analysed. By rapid prototyping techniques, some prototypes are realised using 3D Printing CAM system.

- The method of Finite Element Analysis (FEA) is used for simulating the behaviour of proposed footwear prototypes, both for uppers and bottom components, during walking.

Innovative solutions, techniques and methodologies, that are transferable in footwear companies by:

- Functionally optimising the footwear uppers, lasts, heels and soles based on characteristics identified for the high arched foot,
- Setting up modern procedures for structural and functional analysis of footwear designed to support and compensate high arched feet;
- Assessment of parameters that morphological and structurally define the feet of persons with high arched feet;
- 3D modelling and 2D pattern engineering for semi customised footwear, lasts and components;
- Rapid prototyping using the 3D printing equipment

The research team will have researchers, experts and technicians who will be engaged in three main types of activities:

- experimental/laboratory research;
- design, development and rapid prototyping;
- technological transfer in footwear companies.
Innovative systems and technology solutions, integrating versatility, flexibility, productivity, and quality are being developed. Here are some examples:

- Footwear cutting systems
- Automatic systems for surface treatment of soles
- Automation of specific operations, especially those with less added values
- Finishing technology for differentiation, customisation and improvement in finished footwear
- Flexible storage solutions

The innovative solutions for materials, components and processes/technology level demand new concepts of quality control. Some innovative quality control systems are being developed accordingly, such as:

- System to analyse the level of biodegradability of the materials/components
- Methodology to calculate the comfort index of footwear

Some items to be considered in the field of:

**Practices:** i) New business models; ii) Good practices on environment and hygiene and security at work; iii) new practices on energy rationalisation; iv) product and systems certification according to existing and new standards; v) quality control procedures
i) new equipment with high contents of technology, providing high levels of flexibility, productivity and quality of the products in the entire chain of footwear engineering and manufacturing such as CAD/CAM, automatic cutting and marking machines, automatic stitching machines; ii) new quality control equipment to face up new standards emerging from consumer demand or specific legislation; iii) new ICT systems interacting with manufacturing and managements, such as:

- **Hybrid manufacturing systems** using technologies such as *Selective Laser Sintering – SLS, Fused Deposition Modelling – FDM* or *3D printing* (a digital model of a shoe component is transformed – layer by layer – into its physical implementation by solidifying powdery or melt-processable materials with different physical or chemical processes).

- **Highly responsive technologies for on-demand production** aiming to shorten the response time of the entire value creation chain to new market demands.

- **Resource-conscious machines and processes** - machines with a high degree of automation, equipped with self-learning software, featuring minimal consumption of energy and materials, as well as resource-conscious processes that are conceived in a resource-saving manner.

- **Online and real-time quality assurance** - online quality data collecting system which can communicate in real time with the main system in order to analyse, compare, quantify and eventually eliminate deviations from the predefined
According to the Oslo Manual, “As Organisational Innovation is the Implementation of a new organisational method in the firm’s business practices, workplace organisation or external relations” (OECD, 2005). The definition does not include at all the concept of Business model innovation, and all existing public innovation surveys, such as the European one, the Community Innovation Survey (CIS), published every year for all European countries, do not collect data about it. The other three types of innovation are Product innovation, Process Innovation and Marketing Innovation. Business Model Innovation can be mapped into these four types of innovation and some data about it can indirectly be obtained. In general, radical product, process and organisational innovations will more often be connected with a new business system than incremental innovations.

There is no general agreed definition on business model and therefore the same is valid for innovations in the business model. As a term, Business Model is easily understood at its basic level by all parties involved, and it is accepted that whenever a new business is initiated it has to employ a business model which describes the organisational and financial architecture of the business. A business model is not simply a spreadsheet or a product of a computer programme, or a cash-flow procedure, but it encompasses the whole concept of operation of the business, including the products, the customers, the responses to the changing needs, its financial performance, etc. A business model is the methodology aiding an enterprise to collect and analyse the necessary information required for its operation and in particular about the:

- Value proposition for all stakeholders including, apart from the customers, the business partners, business employees, owners and investors. It represents the way a business creates value and from whom it generates it. It measures the net profit remaining in the
enterprise from the product/service it offers to its customers.

- The operational capabilities of the enterprise, which includes business employees, business partners, available infrastructure, marketing and financial plans and go-to-market plans. The organisation needs to appropriate some of the value proposition and the cost for doing the product/service must be lower than the generated revenues.

- Strategic decisions regarding the positioning of the enterprise in terms of markets to serve, products for these markets, etc.

Business models are strongly associated with current innovative technological research, as it is accepted that a research outcome is less sustainable if it is not associated with a differentiated business model. It is suggested that “the more radical a technological innovation, the greater the need for business model innovation in order to capture (part of) the value created by the new technology” (Teece, 2010), and “Today, innovation must include business models, rather than just technology and R&D” (Chesbrough, 2007). However, the development of an innovative business model is not an easy task, neither for established businesses nor for start-ups, as it is not a trivial task and the theory behind it has not been fully exploited and there is not a common knowledge and methodology to apply for every business case. Developing an innovative business model is a trial and error and ex-post adaptation process. The business models through simulations or real experiments are common management practice.

Business model innovation is influenced by many factors such as:

- It is difficult to replace a successful business model as this existing model creates disincentives for alternatives.
- Top management needs to show openness to change and experimentation, as their support and vision are absolutely necessary to realise the changes that are proposed by a new business model.
- Resources are necessary in early stages, when the business model is formulated when no ideas are proposed and also when the scaling of the business is taking place.
- Experience in experimentation is a necessity
- Collaborations are a key part of business models

It is agreed by all researchers that education and training in business model innovation is essential if
a new generation of business leaders is going to be developed who are aware of these subjects and this in turn requires some changes in the curricula offered by business schools. “Management training needs strengthening in scientific curricula. Issues related to innovations in business models and services should be more widely included in academic education” (ERIAB 2012). In relation to research projects and linking research results to sector requirements, research outputs can benefit from adopting business model tools and methodologies, like hypothesising possible product variations, experimenting with customers in early stages, generating and interpreting data and information gathered from customer testing, preserving, pivoting or perishing product value and business proposal.

Another aspect of business model research and practicing is that they are strongly connected to customers and markets. The business model provides the infrastructure through which profit is generated in the company by exploiting the preferences of the market. Academic research is mainly driven from a new technology based idea and not a market driven need. Therefore, by networking enterprises and research organisations, academic start-ups can benefit from research into business model innovation, as they are more concentrated on the technical aspects of their ideas and not on the sustainability of the enterprise.
Section D

Inventory of Research, Development and Innovation (RDI) projects
The aim of this section is to have an overview of the actual RDI topics for the footwear sector. 15 RDI projects, which have been funded in the last 5 years at national or European level, were identified. Their detailed description, including the Title of the project, Funding organisation or programme, Country/ Partners, Objectives, Website, Results/Relevant information for K4F project, is presented in Annex 2.

- NANOFOOT- Materials, Components and Footwear with enhanced comfort properties based on nanotechnologies
- NanoMAPS - Low Loss Nanocrystalline Magnetic Material for High Efficiency Power Supplies
- Mobility-Preventing gait deficiencies and improving biomechanical parameters for the elderly population by designing and developing customised footwear
- DEMOSHIPINSTANTSHOE - Development of a cost-effective footwear based on shape memory materials to provide an instant fitting personalisation service at the retail shop for enhancing user's comfort
- DEMOULTRAGRIP. Implementation of high grip designing tools
- MICROTAN. Recovery of tannery wastes for functional microencapsulated products
- SHOEBAT. Promotion of best available techniques in the European footwear and tanning sectors
- SMARTPIF. Smart tools for the prescription of orthopaedic insoles and footwear
- High Speed Shoe Factory
- Contributions to footwear sustainability – new biodegradable materials
- SHOE-ID - RFID applied to shoe production, distribution and sales chain
- BE NATURE – Disintegrable leather in composting conditions
- NEWALK - Materiais, componentes e tecnologia para calçado do futuro
- STRESSLESSSHOE
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015-1-RO01-KA203-015198

- OPT-SHOES - Development of cost-effective and accurate computer-aided design and engineering (CAD/CAE) tools for the determination and optimisation of footwear comfort parameters

The European Footwear sector is very sensitive to global challenges; therefore, it should make important changes by adding value to its products. And the added value comes from research and innovation in terms of styling and design, customisation, brands, high quality, high-tech, new business models, sustainable development and environmental values. In a global economy where enterprise sustainability and employability are uncertain it requires the best knowledge and application of good practices and the mastery of the most advanced methodologies for transferring the results of research into the work environment though real project-based work focused on technological transfer. However, most footwear companies are small and medium sized. For this reason, most of the companies cannot create internal research and technological transfer departments and they are very much dependent on external offers of universities and/or research centres.

All these challenges require highly qualified employees, including qualified workers and machine operators, technicians, engineers, product & process developers, and top and middle managers, who should have the right mix of skills, both professional and transversal, in order to demonstrate their competence for applied research, development and technological transfer. Also, because of labour costs, most of the footwear companies cannot afford to have numerous staff with an academic degree or much narrowed specialised employees. Therefore, for top and middle managers, for engineers, for product and process developers with skills and competencies in research, innovation and technological transfer is more than necessary in order to complete their experience and knowledge background. Linking the education with the work environment is one of the goals of the EU policies and national political priorities in all EU 28 countries. Therefore, supporting active learning by creating the right mix of core, transversal and professional skills, emerges from the recommendations on different levels: EU, national authorities and social partners.
Inventory of good practices, projects and initiatives that demonstrate the link among universities, research centres and enterprises
European reports and directives, projects and networking initiatives upon this subject require for integrating project based work, research and development activities with teaching and training activities based on the numerous advantages that are reflected to the ones who are customers of the education/training business, the learners. Besides the incontestable truth that research and project based work enrich training, there are factors that make this process not so easy. A research about fundamental review of research policy and funding, undertaken by Higher Education Funding Council for England (HEFCE) has concluded that “new ways of managing the teaching and research relationship need to be considered” [28]. The education – research – industry relations should function increasingly as laboratory of knowledge-intensive networks.

Each partner has identified the good practices, projects and initiatives that demonstrate the link between universities, research centres and enterprises. This section includes documented results on project and initiatives in TCLF (Textile Clothing, Leather and Footwear) sector, but also in other sectors as examples of good practices.

Partners searched for such successful links among universities, research centres and enterprises, such as: projects, partnerships, clusters, alumni networks, networking events, successful public funding schemes for SMEs-HEIs collaboration, involvement of companies in the students’ selections for Master or PhD thesis, student placement to companies etc. 23 successful initiatives that are listed below were identified as examples of good practices. Annexe 3 presents a detailed description of each project.

- PRACTICA - From theory to practice
- First Step to First Job – Innovative Methods Leading Youth to a Solid Career
- European Sector Council on Employment and Skills in the Manufacturing Industry: First Year of Operation, Activities and Initiatives
- Establishing a European Sector Council for Commerce on Employment and Skills

Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015-1-RO01-KA203-015198

- Analysis of Feasibility of Creating European Sector Councils on Employment and Skills in the Audiovisual and Live Performance Sectors
- Network Proactive Management of Change and Restructuring (Network ProMCR)
- Regional innovation pole –a policy for clustering and product development
- A festival for technology transfer
- Textile & Clothing Business Labs (TCBL)
- Technology Enhanced Learning Living Lab for Manufacturing Environments
- Customer-oriented and eco-friendly networks for healthy fashionable goods
- CLEVERTEX
- ATC21S – Assessment and Teaching of 21st Century Skills
- SHOES MADE IN EU - European Industrial Shoe Maker
- DUAL TRAIN- Building a sustainable approach to the dual vocational training system in Portugal, Spain and Germany
- Advan2Tex - E-learning course for innovative textile fields
- INGA-3D - Creative transfer of competence in 3D footwear CAD to VET professionals
- TIED SHOE - Training in Innovation, Entrepreneurship and Design for the Footwear Industry
- SHOE FUTURE - Education of new generation of leather and footwear expert profiles
- E-SHOE LEARNING - Training innovation in the footwear sector
- SHOE FUTURE - Education of new generation of leather and footwear expert profiles
- STEP TO SUSTAINABILITY
- BMW – Be a mentor in the workplace

Involving education, research and industry will increase Europe's capacity for innovation. By creating and developing so-called Knowledge Platforms through a real partnership among tertiary and vocational education, research and industry, this idea will become sustainable.
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015 - RO01 - KA203 - 015198
Section F

FIELD RESEARCH

F.1. Planning and methodology
F.2. Study on installed capacity to perform research, development and innovation in footwear manufacturing
F.3. Skills for research, development and innovation in footwear manufacturing
The field research seeks to identify the MIX of transversal and professional skills that can boost the transfer of novelties coming from research and innovation into product, processes and services in order to increase the competitiveness of the footwear industry.

The survey was used to collect replies from experts and professionals of European enterprises and High Education Centres (HE) working with the footwear sector in five partners’ countries (RO, ES, PT, GR, HR) as well as from other six European Member States outside the consortium. Project partners carried out the survey in their respective countries by approaching representatives of companies or University/ Research Centres either in situ or by electronic message. Selected respondents had the following profiles:

- Managers or/and other professionals having managerial responsibilities (engineers/technicians, designers) in European footwear enterprises,
- HE experts and academic staff from universities
- Researchers involved in RDI activities for the footwear sector.

Steps to follow in obtaining replies to the questionnaire:

- Contact the relevant stakeholder (included in the list from each country) for introducing K4F project and confirming the participation in survey
- Send the questionnaire (via e-mail, mail, fax or link to on-line form) mentioning the deadline for completing
- Check the replies to the questionnaire
- Re-contact the respondent(s) in case on missing or confused replies to clarify content
- Collect the questionnaires from the respondents
- Create a data base to enable statistical analysis
- Check data base for errors and submit the results (excel file)
- Perform the survey analysis
Background information

There were 108 questionnaires collected from companies. The questionnaires were completed by managers or/and other professionals having managerial responsibilities in: 23 Greek companies, 10 Croatian companies, 12 Portuguese companies, 25 Romanian companies, 23 Spanish companies, and 15 companies from EU countries outside the consortium: UK-1, Germany-1, Poland-6, Italy-1, Czech Republic-4, Slovenia-1, Sweden-1.

Graph 1 shows the sample structure according to the number of companies’ employees:

- 12 out of 108 participating companies had fewer than 10 employees (11.11%);
- 51 companies had between 11-50 employees (47.22%);
- 17 companies had between 51-100 employees (15.74%);
- 16 companies had between 101-250 employees (14.81%);
- 12 companies had more than 250 employees (11.11%);
Graph 2 shows the **category of products** that participating companies produce:

- 99 companies (92.26%) produced footwear
- 6 companies (6.05%) produced footwear components
- 3 companies (1.69%) did not answer

Graph 3 displays the **target group** of companies:

- 77 out of 108 produced “ladies’ shoes”
- 61 produced “men’s shoes”
- 28 produced “children’s shoes”

Some companies manufactured shoes for different target groups.

Graph 4 details the **type of shoes** manufactured by companies participating in the survey:

- 38 companies produce high fashion shoes
- 55 companies produce casual shoes
- 19 companies produce sports shoes
- 10 companies produce occupational and safety shoes
- 10 companies produce outdoor and hiking shoes
- 5 companies produce orthopaedics shoes
- 1 company produce therapeutic or prophylactic shoes
- 13 companies produce other than anatomic-comfort, winter & summer footwear, comfort shoes
Graph 5 divides companies by the **quantity of shoes exports**:
- 19 companies did not export their products
- 25 companies exported less than 25%
- 16 companies exported between 25% and 49%
- 13 companies exported between 50% and 75%
- 27 companies exported more than 75%
Some companies (8) companies did not answer

Graph 6 shows the sample structure according to the existence of a **Research, Development and Innovation (RDI) department**:
- 37 companies had an RDI department (34.26% of the companies)
- 69 companies did not have an RDI department (63.89% of the companies)
- 2 companies did not answer
Graph 7 divides companies according to the existence or not of staff with specific responsibilities in RDI, among their daily responsibilities as managers, designers or engineers/technicians:

- **61 companies** had specific staff with responsibilities in RDI among their daily responsibilities as managers, designers or engineers/technicians (56.48%);
- **37 companies** did not have specific staff with responsibilities in RDI among their daily responsibilities as managers, designers or engineers/technicians (34.25%);
- **10 companies** did not answer.

Graph 8 shows the sample structure according to the position of the respondent within the company:

- **60 managers** are the owner/CEO
- **3 managers** are the Head of RDI
- **6 managers** are the Head of Product Development
- **11 managers** are the Head of Manufacturing
- **28 managers** occupy other positions like production coordinator or sales manager
Graph 9 shows the sample structure according to the study grade obtained by the respondent:

- 20 managers have Secondary level of studies
- 39 managers have Bachelor studies
- 31 managers have Master studies
- 4 managers have PhD studies
- 14 managers have other studies

Graph 10 shows the sample structure according to the gender of the respondent:

- 68 managers are males (62.95%)
- 40 managers are female (37.04%)

Graph 11 shows the sample structure according to the respondent’s age:

- 3 managers are under 25 years old (2.77%)
- 38 managers are between 25-39 years old (35.18%)
- 57 managers are between 40-59 years old (52.77%)
- 10 managers are more than 60 years old (9.25%)
Collaboration between the industry and universities/research centres

Graph 12 shows that 54 companies (50%) have collaborated with Universities/Research Centres in the last 5 years; 49 companies affirm that they have not (45.37%) and 5 did not answer (4.62%). Most collaborations (Graph 13) consist of:

- Host of student-interns (31 companies out of 108)
- Partnership in Research & Development projects (27)
- Participation in joint events and/or networks/clusters/meetings (21)
- Sharing and transferring knowledge from/to company (17)
- Supporting students’ graduation thesis (13)

Graph 14: Benefits of cooperation between companies and Universities/ or Research Centres. The 108 companies selected multiple choices

Graph 13: Distribution by type of cooperation between the company and Universities/ or Research Centers. The 108 companies selected multiple choices
Companies’ representatives justified the lack of cooperation with universities and research centres with the following arguments:

- There is no information;
- Lack of time and human resources;
- We have no access to information;
- I did not have any chances to do that nor did I need it;
- no opportunities in Greece. For example here sellers do research;
- I have not had contacts, but I would be open for future cooperation. In Greece, there are no more Research Centres (sadly);
- There is zero action for Research Development and Innovation in Greece. There are no real schools for footwear textile. There are just opportunists, speculators who want to take advantage of young people;
- It is the first time that a University or Research centre has asked for this;
- There is nothing that is relevant to the footwear industry or a project that interests the production
- We have no access to information;
- There are resources and contacts. Experience teaches more and better;
- There were none available, and there is a deep Crisis/Recession;
- No access to information;
- We had no opportunity;
- We have collaborated with universities, but not with technical departments;
- We have never considered it;
- In principle, the business has been focused on the internationalisation process, especially in the commercial field;
- Because we have not had the opportunity to work together with any collaborating entity, we carry out all projects internally;
- It has not arisen;
- No adequate project has been submitted in due course;
- They were not interested;
- We had no the opportunity;
- Decisions taken in France;
- We do not need research for now.
Most common benefits of establishing a collaboration (Graph 14) indicated by companies were:

- Competitiveness rise (62 companies out of 108)
- Increased added value of products (62)
- Access to research results (51)
- Better management (31)

Regarding the company’s interest in becoming part of a Knowledge Community (Knowledge Platform for footwear manufacturing that facilitates the collaboration towards innovation and technological transfer among universities, companies and research centres):

- 83 companies (76.85%) confirmed their interest;
- 23 companies (20.37%) lacked interest
- 2 companies (2.77%) did not answer.
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**Reasons for becoming part of a Knowledge Community:**

- Staff’s enrolment in online courses on footwear innovation & technological transfer (60 companies out of 108)
- Participation at events organised by Knowledge4Footwear platform (eg. brokerage sessions for identifying project ideas) (49)
- Supporting placements of High Education students (38)
- Evaluation and validation of the platform content (e.g. training needs, training curriculum and content for virtual internships) (27)
25 companies out of 108 were not interested in becoming part of a Knowledge Community or did not answer. The lack of interest (Graph 17) was due to:

- It was not a priority in the current company’s strategy (16 out of 25)
- The company did not have the resources (8 out of 25)

Role of education and research in fostering innovation

An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” (Source: OECD, Oslo Manual. Guidelines for collecting and interpreting innovation data, p.46, available at [http://ec.europa.eu/eurostat/documents/3859598/5889925/OSLO-EN.PDF](http://ec.europa.eu/eurostat/documents/3859598/5889925/OSLO-EN.PDF)
The following levels of innovation have been defined:

- Level 1 – minimal changes to existing products, with low investment and risk
- Level 2 – new features integrated into the existing products, with medium investment and risk
- Level 3 – new products, with large investment and medium risk
- Level 4 – new products that are revolutionary (for example, products that change how people live), with large investment and big risk

**Graph 18** illustrates how much Managers appreciated their organisational level of innovation: Level 2 (48 out of 108), and Level 1 (42 out of 108), which means that the majority of managers were satisfied with their company’s level of innovation.
Graph 19 illustrates statements that most accurately described the company’s strategy in terms of Research, Development and Innovation activities. Participants could choose more than one option:

- “My company develops new footwear product concepts, a stage which usually involves: a) design and prototyping; b) development and testing; and c) further research to modify designs and to improve the product’s characteristics.” (48 companies out of 108);
- “My company is aware about the latest knowledge towards innovation in footwear manufacturing. We use in-house know-how and skills through our design, engineering, and/or marketing own departments. Also, the skills of the staff engaged in development and innovation activities are developed through internal training.” (45)
“My company is engaged in applied research in terms of: a) new materials and components for footwear; b) design and product development; c) advanced technologies; and d) sustainable manufacturing processes.” (38)

“My company identifies the opportunities for commercialisation resulting from its own strategic research and applies new marketing methods and business models to become more competitive.” (32)

“My company performs various research and development work to adapt and modify the technical information toward innovative materials, product and/or process to its own needs” (28)

7 companies out of 108 did not agree on any of the hereby statements to describe the company’s strategy in terms of RD&I activities, among their answers being identified the following situations:

- Innovation is relevant if it helps improve the company’s market position
- No comments
- Our company is lacking educated and skilful people, staff that possess modern technological and social knowledge

70 out of 108 companies considered that their staff needed advanced training for performing Research, Development and Innovation activities (Graph 20). One company did not reply and the other 37 considered that their staff does not need such advanced training.

Graph 20: Company’s staff needs of advanced training for performing Research, Development and Innovation activities
The majority of companies (53.70% of the 108 companies) considered that current study programmes at universities do not stimulate creative thinking and problem solving approach among their students/graduates (Graph 21). 34.25% of the companies considered Yes and the rest of 12.03% did not reply.

Graph 22: Actions to be taken by education and training providers to encourage students to deal with the footwear industry requirements for innovation
Graph 22 presents the most common actions chosen by company’ managers: to be taken by education and training providers to encourage students to deal with the footwear industry requirements for innovation

- **Action a (65 out of 108):** “to take the students out of the classroom and to give them the necessary support to apply their knowledge to real work environment in a multidisciplinary way, including research, design and development, manufacturing, marketing and management”;

- **Action c (59 out of 108):** “to enrich the study/training programmes with modules with a focus on “key” issues of innovation for footwear industry, such as: CAD, rapid prototyping indro-engineering, 3D printing, eco-design, advanced and flexible manufacturing, sustainability, customised and specialised production, new organisational methods, etc.”; and

- **Action b (55 out of 108):** “to apply a coherent programme for stimulating creative thinking, which may include:
  
  o a) to encourage students to come up with innovative ideas about new products, concepts, processes and/or technological changes;
  o b) to give students the opportunity to turn the new ideas into real products;
  o c) to provide necessary resources (capital) for prototyping and testing;
  o d) to reward the successful ideas of the students”.

K4F project will develop a training programme focused on research, development and innovation for the footwear sector. In order to design a training curriculum that reflects the needs of the companies, the respondents were invited to evaluate the importance of the knowledge/skill in relation to the future training programme.
According to footwear companies’ representatives, the knowledge/skills were evaluated in relation to their importance in a training programme for Research, Development and Innovation (\textit{Graph 23}): 

\begin{itemize}
  \item A. to demonstrate broad knowledge on the footwear products’ processes and related technology/machinery, including all phases of footwear manufacturing and different types of construction, design techniques raw materials and components. 41 companies of 108 identified this knowledge/skill as being very important and 31 extremely important.
  
  \item B. to elaborate and to apply the procedures and tools for a Research and Development Management System, including new product development, 43 companies of 108 identified this knowledge/skill as being important.
\end{itemize}
technology development, process development, technological transfer and 36 very important

<table>
<thead>
<tr>
<th>C. to carry out projects in relation to the latest developments on new materials and components for footwear</th>
<th>35 companies of 108 identified this knowledge/skill as being important and 39 very important</th>
</tr>
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<tbody>
<tr>
<td>D. to develop new footwear concepts and products based on specific requirements of various customers and market trends</td>
<td>27 companies of 108 identified this knowledge/skill as being important and 45 very important</td>
</tr>
<tr>
<td>E. to carry out projects in relation to the latest developments on new manufacturing technologies and business models</td>
<td>38 companies of 108 identified this knowledge/skill as being important and 35 very important</td>
</tr>
<tr>
<td>F. to comply with the available legislation, regulations, certifications and standards regarding products and manufacturing processes</td>
<td>40 companies of 108 identified this knowledge/skill as being important and 31 very important. 25 companies appreciated this skill as being extremely important</td>
</tr>
<tr>
<td>G. to demonstrate soft skill adapted to complex projects and working situations, such as: creative and critically thinking, solving problems, team working, entrepreneurial thinking</td>
<td>41 companies of 108 identified this knowledge/skill as being important and 39 very important</td>
</tr>
</tbody>
</table>
A second survey was elaborated and addressed to experts of Higher Education, Research and Technological Centres. In total, 50 contributions from 23 universities and research centres were collected: Romania - 12, Italy - 1, Croatia - 17, Greece - 7, Spain - 6, Portugal -5, Turkey – 1, Republic of Moldova -1.

**Background information**

**Graph 24** shows the position of the respondent in the entity where he/she works:

- 6% - Head of Research Centre
- 22% - Head of Faculty/Department
- 46% - Academic Staff
- 26% - Researchers

*Graph 24: Position of the respondent in the entity where he/she works*
Graph 25 illustrates the study level reached by the respondent:
- 4% have bachelor studies
- 16% have master studies
- 80% have PhD studies

Graph 26 shows the sex of the respondent:
- 56% of the respondents were male
- 44% of the respondents were female

Graph 27 gives the age of the respondent:
- 26% were between 25-39 years old
- 56% were between 40-59 years old
- 16% were more than 60 years old
- 2% did not reply (1 participant)
Graph 28 shows that 94% of the Universities or Research Centres collaborated with companies in the last 5 years.

**Graph 28:** Collaboration between Industry and Universities/ or Research Centres in the last 5 years

Graph 29 shows the type of collaboration between Industry and Universities or Research Centres. Multiple answers were possible.

Representatives of Universities & Research Centres indicated that their collaboration with Industry (Graph 29) consisted of:

- Forecast of skills requirements for the labour market - 26% (13 out of 50)
- Design of training programmes and curriculum development - 36% (18 out of 50)
- Recognition and validation of skills and competences - 18% (9 out of 50)
- Host of student-interns - 50% (25 out of 50)
- Placement of graduates - 38% (19 out of 50)
Supporting students’ graduation thesis - 38% (19 out of 50)
Sharing and transferring knowledge from/to company - 50% (25 out of 50)
Partnership in Research & Development projects - 64% (32 out of 50)
Participation in joint events and/or networks/clusters/meetings - 62% (31 out of 50)
Development of innovative companies, including spin-offs and start-up companies - 8% (4 out of 50)

Those interviewees discouraged on cooperating with a University or Research Centre indicated the following reasons:

- “I am intensively working on a doctoral dissertation whose theme is in other areas of research”
- “My age (81) doesn’t allow me to begin work in the new field of research”
- “We have tried in the last years to cooperate, but there was not a positive response from the Greek footwear industry. Manufacturers are fewer and face other financial problems to take care due to the economic crisis. On the other hand, with the outsourcing and the considerable reduction of labor costs, it is difficult to introduce robotics technology and automation”
- “Economic Crisis of Greece, Lack of footwear sector in the town where the University is located; Shutdown of ELKEDE”

Graph 30 shows that 90% of Universities and Research Centres interviewed were interested in becoming part of a Knowledge Community (Knowledge Platform for footwear manufacturing that facilitates the collaboration towards innovation and technological transfer among universities, companies and research centres).
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015-1-RO01-KA203-015198

Graph 31 illustrates the reasons for Universities and Research Centres for becoming part of a Knowledge Community like Knowledge4Foot platform. Some interviewees chose both choices.

- 54% of interviewees (27 out of 50) were interested in “Evaluation and validation of the Knowledge4Footwear platform content (e.g. training needs, training curriculum and content for virtual internships)”
- 66% of interviewees (33 out of 50) were interested in “Participation at events organized by Knowledge4Footwear platform (e.g. brokerage sessions for identifying project ideas, conference)”

5 interviewees declared that they are not interested in becoming part of a Knowledge Community (graph 30): 3 interviewees stated that “no resources” represented the reason for their University and/or Research Center’s lack of interest in becoming part of a Knowledge Community and 2 interviewees stated that it was “not a priority in our current company’s strategy” to become part of a Knowledge Community.
It can be observed (Graph 32) in the above graph that 100% of interviewees stated that High Education students/graduates needed advanced training for performing Research, Development and Innovation activities.

The graph above shows that:

- 70% of interviewees (35 out of 50) stated that universities’ current study programmes stimulated creative thinking and problem solving approach among their students/graduates.

- 30% of interviewees (15 out of 50) stated that universities’ current study programmes did not stimulate creative thinking and problem solving approach among their students/graduates.
Participants in the survey were invited to indicate what actions educational and training providers should take in order to address the footwear industry requirements for innovation. Participants could select more than one action, and the results were:

- **Action c:** To enrich study/training programmes with modules with a focus on “key” issues of innovation for footwear industry, such as: CAD, rapid prototyping and reengineering, 3D printing, eco-design, advanced and flexible manufacturing, sustainability, customised and specialised production, new organisational methods, etc. (76% representing 36 interviewees out of 50).

- **Action a:** To take the students out of the classroom and to give them the necessary support to apply their knowledge to real work environment in a multidisciplinary way, including research, design and development, manufacturing, marketing and management (72% - 32 out of 50).

- **Action b:** To apply a coherent programme for stimulating creative thinking, which may include: a) to encourage students to come up with innovative ideas about new products, concepts, processes and/or technological changes; b) to give students the opportunity to turn up the new ideas into real products; c) to provide necessary resources (capital) for prototyping and testing; and d) to reward the successful ideas of the students (60% - 30 out of 50).

- **Action d:** Other (6% - 3 out of 50).
K4F project will develop a training programme focused on research, development and innovation for the footwear sector. In order to design a training curriculum that reflects the views of the experts from universities and research centres, the respondents were invited to evaluate the importance of the knowledge/skill in relation with the future training programme.

The knowledge/skills were evaluated in relation to their importance into a training programme for Research, Development and Innovation (Graph 35):

A. to demonstrate broad knowledge on the footwear products’ processes and related technology/machinery, including all phases of footwear manufacturing and different types of construction, design techniques raw materials and components

B. to elaborate and to apply the procedures and tools

Graph 35: Importance of knowledge/skill in relation with the future training programme. Multiple answers were possible.

20 experts of 50 identified this knowledge/skill as being very important and 18 extremely important.

20 experts of 50 identified this
### Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**PROJECT 2015-1-RO01-KA203-015198**

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<td><strong>for a Research and Development Management System, including new product development, technology development, process development, technological transfer</strong></td>
<td>knowledge/skill as being very important and 18 extremely important</td>
</tr>
<tr>
<td><strong>C. to carry out projects in relation to the latest developments on new materials and components for footwear</strong></td>
<td>16 experts of 50 identified this knowledge/skill as being very important and 17 extremely important</td>
</tr>
<tr>
<td><strong>D. to develop new footwear concepts and products based on specific requirements of various customers and market trends</strong></td>
<td>22 experts of 50 identified this knowledge/skill as being very important and 15 extremely important</td>
</tr>
<tr>
<td><strong>E. to carry out projects in relation to the latest developments on new manufacturing technologies and business models</strong></td>
<td>20 experts of 50 identified this knowledge/skill as being very important and 18 extremely important</td>
</tr>
<tr>
<td><strong>F. to comply with the available legislation, regulations, certifications and standards regarding products and manufacturing processes</strong></td>
<td>25 experts of 50 identified this knowledge/skill as being very important and 12 important</td>
</tr>
<tr>
<td><strong>G. to demonstrate soft skill adapted to complex projects and working situations, such as: creative and critically thinking, solving problems, team working, entrepreneurial thinking</strong></td>
<td>21 experts of 50 identified this knowledge/skill as being very important and 18 extremely important</td>
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</table>
Conclusion

In the countries of the hereby consortium, namely Spain, Portugal, Romania, Croatia and Greece, the Footwear sector could bring increased added value per employee. Stakeholders, professional association, social partners, policy makers, experts, etc. have revealed that there is a huge need to increase the level of involvement of research, innovation and creativity in this sector.

Thus, more than ever, the EU leather and footwear companies are forced to boosting their innovative potential. On the other hand, the business itself could benefit from huge knowledge, unexploited yet, in terms of results and innovative solutions that are available from the performed research undertaken by research centres and universities thorough EU and national funded research projects over the last years.

The investigation on the HE needs that was performed by the participating organisations of this consortium has revealed that most of the students or trainees who are following a tertiary level study programme are not familiar with the trends and possibilities of rising up the business in leather and footwear to next level.

Moreover, the RDI activities undertaken by students/trainees, as part of their study or training curriculum, are very limited and they are manly oriented toward getting skills on traditional processes and technologies. That is, in fact, very necessary but not sufficient. Even if the graduates of HE programmes have core and professional skills, they do not have the right skills for performing research, development and technological transfer activities and they are not trained for exploring innovative solutions in companies immediately after they graduate the study/training programme.
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015-1-RO01-KA203-015198
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Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

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Annex 1

TRAINING AND STUDY PROGRAMMES for highly qualified professionals: designers, managers and engineers/technicians

1.1. Study programmes for highly qualified professionals

1.2. Training courses for footwear industry addressing designers, managers and engineers/technicians
Annex 1.1

Study programmes for highly qualified professionals

**FOOTWEAR AND LEATHER GOODS PATTERN ENGINEERING**

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
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<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.inescop.es/formacion/">http://www.inescop.es/formacion/</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level /Qualification. Access requirements</th>
<th>Level 5 EQF Access examination required. Minimum initial qualification bachelor, product designers, industrial designers, people with skills for Official course recognised by the Spanish Labour Ministry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>790 h</td>
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</table>

<table>
<thead>
<tr>
<th>Detailed learning content (curriculum)</th>
<th>1.- Materials, products and manufacturing processes for footwear and leather goods (150 h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Textile materials for garments, footwear and leather goods.</td>
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<tr>
<td></td>
<td>• Leather for garments, footwear and leather goods</td>
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<td></td>
<td>2.- Creation of textile and leather products (60 h)</td>
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<tr>
<td></td>
<td>• Style evolution</td>
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<tr>
<td></td>
<td>• Product feasibility and marketing. Information sources</td>
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<td></td>
<td>• Footwear and leather goods components. Splitting into pieces</td>
</tr>
<tr>
<td></td>
<td>• IT applications</td>
</tr>
<tr>
<td></td>
<td>3.- Footwear pattern engineering and grading processes (210 h)</td>
</tr>
<tr>
<td></td>
<td>• Identification and analysis of footwear features and grading</td>
</tr>
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<td></td>
<td>• Preparation of shells adapted to footwear style design and manufacture</td>
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<tr>
<td></td>
<td>• Transformation and verification of patterns for footwear production</td>
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<td></td>
<td>4.- Pattern making techniques for leather goods and saddlery products (90 h).</td>
</tr>
<tr>
<td></td>
<td>• Leather goods and saddlery products. Interpretation and graphical representation</td>
</tr>
<tr>
<td></td>
<td>• Pattern engineering techniques. Preparation of prototypes</td>
</tr>
</tbody>
</table>
5.- Industrialisation of footwear and leather goods patterns (120 h)
   - Pattern grading
   - Pattern marking
   - IT applications
6.- Work-based learning of footwear and leather goods pattern making (120 h)
7.- Encouragement and promotion of self-employment (30 h)
8.- Employability, environmental and gender equality awareness (10 h)

<table>
<thead>
<tr>
<th>Expert in footwear fashion</th>
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<tbody>
<tr>
<td>Learning provider</td>
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<tr>
<td>Website</td>
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<tr>
<td>Level /Qualification. Access requirements</td>
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<tr>
<td>- Newly graduates who want to target their professional career and first job to the footwear fashion industry.</td>
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<td>- “Fashion lovers” or people who are passionate about everything related to fashion.</td>
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<td>- People from the sector interested in recycling / renewing/ promoting through updated knowledge and experiences that increase their differentiation.</td>
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<tr>
<td>Duration/Number of hours (per day or in total)</td>
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<tr>
<td>Detailed learning content (curriculum)</td>
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<tr>
<th>MASTER’S DEGREE IN DESIGN, GRADING AND PATTERN MAKER OF FOOTWEAR AND COMPLEMENTS</th>
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<td>Learning provider</td>
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<td>Level /Qualification. Access requirements</td>
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<td>Duration/Number of hours (per day or totally)</td>
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</table>
Detailed learning content (curriculum)

Module I
- Footwear history
- Typology
- Planning for a collection development (season division)
- Timing for design and collection development
- Research on materials and components before attending a fair (magazines, the Internet)
- Catwalk analysis
- Footwear components and leather fairs
- Coolhunters. Who are they? Why?
- Fashion trends. What are they? How to identify them? What to pay attention to and how to read them? (16/17 autumn and winter trends will be studied for the project)
- Footwear sale and marketing considerations
- Intellectual and industrial property.
- Fashion and retail
- Target
- Trend boards / moodboards
- Database
- Differences between lasts and shoe constructions
- Colour study, colour prediction and combinations
- Pattern printing
- Style and material selection
- Graphic techniques applied to footwear
- Creativity techniques associated to footwear
- Design selection
- Final illustrations
- Workshop or initial presentation
- Changes and corrections
- Differences among prototype, seller sample and final sample

Module II. Illustrating and sketching
- Contents
- Fundamental and basics of freehand drawing
- Reducing objects to simple geometric shapes
- Volume and chiaroscuro
- Shoe construction patterns
- Types of footwear
- Footwear in perspective
- Digital techniques for colour application
Module III. Digital techniques and portfolio
- Contents
- Drawing with Adobe Illustrator
- Drawing with Adobe Photoshop
- Preparation of technical and artistic sheets
- Preparation of portfolios in advance to know the approach and how to present them
- Orientation and approach of a designer’s CV
- Grading and pattern making

Module IV. Handbags and accessories design
- History of handbags and accessories
- Typology
- Handbags
- Leather goods
- Socks
- Hats
- Glasses
- Jewellery
- Watches
- Belts
- Gloves
- Fans
- Sketching of accessories and handbags
- Planning for a collection development (season division)
- Timing for design and collection development
- Research on materials and components before attending a fair (magazine, the Internet)
- Decorations and piece assembling systems
- Catwalk analysis
- Footwear components and leather fairs
- Trends in accessories
- Model and material selection
- Graphic techniques applied to footwear
- Creativity techniques associated to bags and accessories
- Design selection
- Final illustrations
- Workshop or initial presentation
- Changes and corrections
- Differences among prototype, seller sample and final sample
Module V. Rhinoceros
- 3D tool
- Projects
- Contents
- How to approach company briefing
- Presentation and defence of final dissertations
- Manufacture of shoes and accessories

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>EOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="https://www.eoi.es/es/cursos/16693/programa-de-especializacion-en-diseno-de-calzado-elche">https://www.eoi.es/es/cursos/16693/programa-de-especializacion-en-diseno-de-calzado-elche</a></td>
</tr>
</tbody>
</table>

**Level /Qualification. Access requirements**
Designers and stylists from several fields that would wish to join the footwear labour market. Experienced or non-experienced graduates who would like to renew or re-orientate themselves and their careers towards the footwear industry.

**Duration/Number of hours (per day or totally)**
160 h Friday and Saturday, 5 h/day

**Detailed learning content (curriculum)**

**Module 1: Ideation process**
- Footwear history
- Colour analysis
- Trend forecasting and searching
- The Internet: Blogs. On line shops. Online publications
- WGSN. Market leader in online services for trend analysis
- Fanzines and traditional publications
- Fairs and shows.
- Influencers
- Street style
- Methodology and tools for ideation process

**Module 2: Footwear techniques**
- Anatomy and biomechanics
- Lasts
- Introduction to 3D design
- Pattern making
- Technical sheets
- Drawing

**Module 3: Materials and components**
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

- Leather
- Synthetic fabrics
- Components
- Soles
- Heels
- Prefabricated soles. Leather and injected soles

**Module 4: Enterprise**
- Markets
- Worldwide manufacturing locations
- Commercialisation

**Module 5: Manufacturing processes**

Throughout the programme, and together with the theoretical and practical sessions, several factory tours will be carried out where students will be able to witness the different production processes

**Module 6: Communication workshops and presentations**

<table>
<thead>
<tr>
<th>POSTGRADUATE COURSE IN FOOTWEAR DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning provider</strong></td>
</tr>
<tr>
<td><strong>Website</strong></td>
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<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
</tr>
<tr>
<td><strong>Detailed learning content (curriculum)</strong></td>
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</tbody>
</table>
Material and components: study of materials used in accessories and their handling in production and development processes

Project methodology: communication of the project with an original, visual and graphical presentation.

Footwear project: necessary knowledge and resources to develop a footwear collection to be placed on the market

- Applied techniques:
  Pattern making: technical knowledge that allows generating and materialising the designs by following pattern making guidelines.
  Footwear production processes: studying the different phases found in an industrial production process within the footwear industry.

- Fashion Business
  Trends: studying the main trends that rule the fashion scene.
  Communication and presentation: visual communication and project presentation.

- Integrative and cross-cutting issues
  These contents promote multidisciplinary vision and help access to professional activity.
  Design culture: programme of cultural activities complementing students’ training.
  Career guidance: this offers new opportunities, tools and contacts to successfully head professional activity thanks to an event created for this purpose.

- Final project module: the final project is an essential part of the programme and sometimes projects are prepared with the support of a company within the sector. The objective is to create, develop and present a work integrating all the acquired skills both cross-cutting and specific ones

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**FOOTWEAR DESIGN**

<table>
<thead>
<tr>
<th><strong>Learning provider</strong></th>
<th>University of Aveiro + CFPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.cfpic.pt/">http://www.cfpic.pt/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>EQF level 5 / post-secondary non-tertiary qualification / minimum 12 years of school</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>1000 hours (150 hours transversal contents + 850 hours of technological contents)</td>
</tr>
</tbody>
</table>
## Objectives of the course

The main objective is to develop skills and competences in the students to create and develop footwear according to fashion trends, quality, commercial strategy of the company and all technical constraints and limitations of the manufacturing. At the end of the course, the graduates should be able to:

- Follow the fashion trends at national and international level, in terms of aesthetic lines, materials, accessories, colours, innovation and market trends
- Articulate the product mix with the market trends and demands
- Elaborate manually or through CAD, from the original idea, footwear scratches, designs, aiming at developing a footwear collection
- Collaborate in the construction and industrialisation of prototypes
- Structure and plan the development strategy of a footwear collection
- Participate in the development & industrialisation of footwear.

## Detailed learning content (curriculum)

<table>
<thead>
<tr>
<th>General/transversal contents:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Commercial English – 50 hours</td>
</tr>
<tr>
<td>- Technical English - 50</td>
</tr>
<tr>
<td>- Oral communication skills - 25</td>
</tr>
<tr>
<td>- Commercial law – 25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technological contents:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fashion History - 50</td>
</tr>
<tr>
<td>- Marketing of fashion industries - 50</td>
</tr>
<tr>
<td>- Design – graphic and expressive - 50</td>
</tr>
<tr>
<td>- Design – technical, anatomic and perspective - 50</td>
</tr>
<tr>
<td>- Theory and application of the colour - 50</td>
</tr>
<tr>
<td>- Fashion trends - 50</td>
</tr>
<tr>
<td>- Brief approach to history of the design – 25 hours</td>
</tr>
<tr>
<td>- Perception and visual communication - 25</td>
</tr>
<tr>
<td>- Methodology of project - 25</td>
</tr>
<tr>
<td>- Computer assisted design – CAD 3D – footwear models - 50</td>
</tr>
<tr>
<td>- Infographics 2D – treatment of images - 50</td>
</tr>
<tr>
<td>- Infographics 2D – vectorial design - 50</td>
</tr>
<tr>
<td>- Design supported software – animated catalogues - 50</td>
</tr>
<tr>
<td>- Creative process - 50</td>
</tr>
<tr>
<td>- Industrial budgetary - 25</td>
</tr>
<tr>
<td>- Atelier of fashion design - 50</td>
</tr>
<tr>
<td>- Portfolio - 50</td>
</tr>
<tr>
<td>- Project of design of a Spring/summer collection - 50</td>
</tr>
<tr>
<td>- Project of design of an Autumn/Winter collection - 50</td>
</tr>
</tbody>
</table>
## INTENSIVE COURSE ON FOOTWEAR DESIGN

<table>
<thead>
<tr>
<th><strong>Learning provider</strong></th>
<th>School of Fashion “Gudi”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.escolamodagudi.com">http://www.escolamodagudi.com</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>EQF level 5 / post-secondary non-tertiary qualification / minimum 12 years of school</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>1 year course delivered after working time (Sept-July)</td>
</tr>
</tbody>
</table>

### Objectives of the course

The main objective is to facilitate the acquirement of tools that allow to create, elaborate and coordinate a project in the field of footwear design, to propose technically and economically feasible solutions, to decide based on critical spirit, to manage and control creative processes and develop research and projects in the field. The course is focused on the development of creative skills more than on engineering skills.

The mission of the school is to raise creative professionals for the footwear sector, motivated and ambitious to succeed.

At the end of the course, the student should be able to:

- Identify the main aspects of the footwear and design history
- Distinguish the different materials and components used in the conception of footwear
- Make sketches of footwear
- Make sketches of footwear using digital technology
- Illustrate footwear models
- Use different techniques to develop footwear models
- Use techniques of marketing
- Design and develop an entire footwear collection

### Detailed learning content (curriculum)

- Introduction to History of design – vocabulary dedicated to footwear
- Technology of materials and components for footwear
- Illustration – techniques of representation of footwear
- Digital illustration of footwear - Story/moodboards, technical design, footwear illustration, footwear project
- Pattern making – pull-over and moulds/ devices
- Marketing – Industry and footwear market, positioning of brands
- Final Project – Conception and development of a footwear collection
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**AUDITING OF MANAGEMENT SYSTEMS**

<table>
<thead>
<tr>
<th><strong>Learning provider</strong></th>
<th>University of Beira Interior + AFTEBI - Associação para a Formação Tecnológica e Profissional da Beira Interior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.aftebi.pt/">http://www.aftebi.pt/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>EQF level 5 / post-secondary non-tertiary qualification / minimum 12 years of school</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>1000 hours (150 hours transversal contents + 850 hours of technological contents)</td>
</tr>
</tbody>
</table>

**Objectives of the course**
The main objective of the course is to develop skills and competences in the field of Quality Management Systems and Auditing in the students willing to integrate organisation that are or preparing their Quality certification processes. The course is directly targeted to footwear, but it can be mould in order to be more oriented to another fashion sector.

**Detailed learning content (curriculum)**

**General/transversal contents:**
- Portuguese language – writing
- English for day-to-day activity
- Human behaviour within the organisations
- Introduction to Management of the organisations
- Maths and Statistics

**Technological contents:**
- Quality Management System – ISO 9001
- Process Management and implementation of indicators
- Environment Management System – ISO 14001
- Environmental legislation
- Security and health at Work management system – OHSAS 18001
- Danger and critical points of control
- Laboratory accreditation system – ISO/IEC 17025
- Ethics and Social responsibility system
- Human resources management
- Implementation of integrated systems
- Management and motivation for Quality
- Quality tools
- Statistic methods: SPC – Process statistic control
- Customer satisfaction assessment cycle
- Measurement and calibration Devices
- Communication and behaviours during audits
- Management Systems' audits – ISO 19011
- Quality audits
- Environment audits
- Security and health at work audits
- Laboratory accreditation audits
- Technical supervisions in hygiene and security at work
- Project on referential and legislation in audits to management systems
- Project on structure of a documental scheme for the implementation of an integrated system
- Project on audits to an integrated management system
- Project for the implementation of PDCA methodology in the audit process of a management system.

### FASHION TRADE

**Learning provider**

University of Beira Interior + AFTEBI - Associação para a Formação Tecnológica e Profissional da Beira Interior

**Website**

http://www.aftebi.pt/

<table>
<thead>
<tr>
<th>Level / Qualification. Access requirements</th>
<th>EQF level 5 / post-secondary non-tertiary qualification / minimum 12 years of school</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>1000 hours (150 hours transversal contents + 850 hours of technological contents)</td>
</tr>
</tbody>
</table>

**Objectives of the course**

The main objective of the course is to develop skills and competences in the field of fashion trade.

At the end of the course, students should be able to:

- Participate in the conception of a marketing strategy of a company
- Perform the planning of commercial visits
- Sell fashion products
- Perform post-sell assistance, analysis of the products implementation, forward of the reclaim
- Participate in fairs and other commercial/marketing events
- Perform the interface between clients and the company, namely the product engineering departments
- Produce reports based on research of information, regarding new products, new materials and processes and the market evolution

**Detailed learning content (curriculum)**

**General/transversal contents:**

- English in socio professional context
- Descriptive statistic
- Communication technics applied to commercial area
- Human behaviour within the organisations
- Commercial duties and ethic

**Technological contents:**

- Product engineering
- Basic notion on pattern making
- Methods and practices of negotiation
- Marketing of fashion
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

- E-business and e-commerce
- Introduction to the fashion business
- Logistics and distribution of fashion
- Budgetary management
- Fashion collections
- Quality and production organisations
- Business management and entrepreneurship
- Commercial and Marketing techniques
- Financial Analysis and Management
- Project management
- Project – conception
- Project – prototyping

OTHER TRAINING PROGRAMMES IN EUROPE

TRAINING IN FOOTWEAR DESIGN AND TECHNOLOGY

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>GERMAN COLLEGE OF FOOTWEAR DESIGN AND TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.english-dsf.info/">http://www.english-dsf.info/</a></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Level /Qualification. Entry requirements</th>
<th>Entry requirements:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• successful completion of an apprenticeship as a shoemaker, an orthopaedic shoemaker or other related, in Germany as well as a minimum of 6-12 months’ work experience in the field</td>
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<tr>
<td></td>
<td>• work experience in shoe manufacturing of at least 5 years</td>
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<td></td>
<td>• apprenticeship in a different field (see FAQs) plus work experience in the field of shoe manufacturing of a minimum of 12-24 months</td>
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</tbody>
</table>

Foreign students need to have a good command of the German language (level B2 of the CEFR). Non-EU nationals need to apply for a residence permit after having been accepted to our further training.

<table>
<thead>
<tr>
<th>Duration/Number of hours (per day or totally)</th>
<th>Total hours of all modules: 2400</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Detailed learning content (curriculum)</th>
<th>Compulsory Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Module 1: Introductory studies in a foreign language (English)</td>
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<tr>
<td></td>
<td>Module 2: Communication in a foreign language (English)</td>
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<tr>
<td></td>
<td>Module 3: Communication and work methodology</td>
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<tr>
<td></td>
<td>Module 4: Organisation of a process-oriented quality management system</td>
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<tr>
<td></td>
<td>Module 5: Determining and evaluating operational data</td>
</tr>
</tbody>
</table>
Module 6: Organisation of a work methodology and process management
Module 7: Project planning and organisation with CAD systems
Module 8: Technical pattern construction (shoes)
Module 9: Planning, implementing and commenting on operation sequences
Module 10: Selecting, testing and commenting on materials
Module 11: Technical pattern construction (boots and sneakers)
Module 12: Collection development
Module 13: Final Project in footwear design

**Additional Modules**
- Module 14: Information technologies
- Module 15: Sole development and design

**Other information which are relevant for K4F project**

The focus of the teaching methodology lies in project-based learning in which students acquire the necessary skills to cope with the multifaceted aspects of an international business life in the footwear industry. Students develop several shoe collections during this two-year period. They learn how to design shoes manually and by using CAD/CAM. The outcome is presented and evaluated in the school as well as in competitions and at fairs.

The projects include:
- trend forecasting
- implementing current trends
- design and implementation of shoe collections
- dealing with technical challenges in shoe production
- participation in fairs and competitions (GDS, Düsseldorf, Germany)

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**FULL-TIME PROGRAMME BUSINESS MANAGER TEXTILES BTE, SPECIALISATION IN TEXTILE OR FOOTWEAR**

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>LDT NAGOLD – FACHAKADEMIE FÜR TEXTIL UND SCHUHE [TECHNICAL COLLEGE FOR TEXTILES AND SHOES]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level/Qualification. Entry requirements</strong></td>
<td>The programme is aimed primarily at candidates with practical experience, who have a completed commercial vocational education or with a fashion industry related job.</td>
</tr>
<tr>
<td></td>
<td>- Completed education</td>
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<td>- Completed vocational training</td>
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<td></td>
<td>- Recommended minimum age: 20</td>
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<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>4 semesters</td>
</tr>
</tbody>
</table>
Detailed learning content (curriculum)  

FIRST AND SECOND SEMESTER
Instruction in the basic subjects from the four departments (core curriculum). The focus is mainly on teaching basic skills. The subjects are grouped into four groups:
- Management and Organisation
- Sales and procurement
- Personnel
- Merchandise: Textile and Footwear

Renowned partner companies from the retail and industry give presentations on a regular basis at the LDT Nagold on a specific subject on which they base their business philosophy. Questions about personnel policy and professional career opportunities are answered and open discussions are held.

HE SPECIALISATION LEVEL - 3RD AND 4TH SEMESTER

INTENSIVE STUDIES
In the third and fourth semester, there are approximately 70 intensive study areas to choose from. These are chosen according to the professional objectives and are also dependent upon the relevant area of specialisation. The specialisation level has a strong practical orientation - instead of lectures, the emphasis is on working with case studies.

Other information which are relevant for K4F project
The specialised degree verifies in-depth merchandise related knowledge in individual special market areas, which are specified in the grade certificate.

DUAL COURSE SYSTEM FOR BUSINESS MANAGER TEXTILES BTE,
SPECIALISATION IN TEXTILE OR FOOTWEAR

Learning provider  
LDT NAGOLD – FACHAKADEMIE FÜR TEXTILI UND SCHUHE [TECHNICAL COLLEGE FOR TEXTILES AND SHOES]

Website  
http://www.ldt.de/en/home.html

Level /Qualification. Entry requirements
High school diploma, general university entrance qualification, advanced technical college entrance qualification and trainee agreement with a company from the textile or footwear industry. Applications must be made at the company. Many companies accept applications all year round.

Duration/Number of hours (per day or totally)  
30 months

Detailed learning content (curriculum)
Subjects are organised in the same way as the full-time model and are summarised in four subject groups:
- Management and Organisation
- Sales and procurement
- Personnel
- Merchandise: Textile and Footwear

THE THEORETICAL PHASES
These are divided into
Once the basic knowledge of retail oriented themes has been conveyed, instruction focuses strategically on team projects, role-playing and case studies. Generally, a distinction is made between basic subjects and in-depth subjects.

At the beginning of the specialisation level, (as of theory phase III) the area Business Administration Retail or Industry must be chosen. The different requirement profiles of the companies are considered here. This specialisation will be noted on the degree certificate (for example: Business Manager Textiles, Specialisation in Retail).

**PROFESSIONAL FOOTWEAR TRAINING COURSE**

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>SHOENIVERSITY, County Kilkenny, Ireland.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.shoeniversity.ie/">http://www.shoeniversity.ie/</a></td>
</tr>
</tbody>
</table>
| Level / Qualification. Entry requirements | • only 6 participants maximum per course  
                                           • previous education or design experience  
                                           • a good level of English and some basic drawing skills and simple arithmetic |
| Duration / Number of hours (per day or totally) | 16 weeks / 6.30 hours daily |
| Detailed learning content (curriculum) | • THE BASICS  
                                           • DEVELOPING YOUR FOOTWEAR AESTHETIC  
                                           • DEVELOPING YOUR FOOTWEAR AESTHETIC 2  
                                           • FINAL COLLECTION |

The 16 weeks’ professional footwear design and manufacture course is designed to enable each student to explore and develop a professional understanding of modern footwear production and equip them with skills that they can use in their own footwear careers on completion.

The course is limited to a maximum of six participants and is taught by permanent and sessional staff from industry through group and individual tutorials, workshops, visiting lecturers and open studio and workshop sessions. You will also be expected to carry on your practice at home with regard to design and research.

**The training will enable participants to work in the footwear industry as freelancers, to set up their own footwear businesses or to work within established organisations.**

There will be opportunities to experience digital production techniques including CAD/CAM for footwear, 3-d printing and laser cutting, but the main emphasis on this course is to give a comprehensive footwear design and manufacture training based on real shoemaking techniques and allowing each person to become an accomplished and innovative designer/maker.
### FOOTWEAR DESIGN SCHOOL IN THE NETHERLANDS

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>SLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.slem.nl/">http://www.slem.nl/</a></td>
</tr>
<tr>
<td></td>
<td>Raadhuisplein 1-2, 5141 KG, Waalwijk, Netherlands</td>
</tr>
<tr>
<td><strong>Level/Qualification. Entry requirements</strong></td>
<td>Bachelor level for master programme. No experience is necessary for the short courses.</td>
</tr>
</tbody>
</table>
| **Duration/Number of hours (per day or totally)** | Master Programme – 9 months  
Short Courses – 1 week |
| **Detailed learning content (curriculum)** | Master programme  
- Footwear Innovation  
Short courses  
- From concept to reality: starting your own footwear brand  
- In-depth 3D design & 3D printing  
- Pattern making  
- Creating an innovative business model  
- Sustainable design  
- Wearable technology  
- Creating better lasts |
| **Other information which are relevant for K4F project** | SLEM is an international innovation and education institute for footwear. They provide a full-time Master programme for Footwear Innovators and a wide range of short courses and workshops for both students and professionals and organise SLEM seminars on innovative topics. |

### DESIGN - CREATIVE SKILLS TO THE NEEDS OF BUSINESS - FINLAND

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>HAMK – University of Applied Sciences Finland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level/Qualification. Entry requirements</strong></td>
<td>Bachelor level</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>4 years</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | FOOTWEAR  
- 15 cr Manufacturing Processes in Footwear  
- 15 cr Product Development of Footwear  
DESIGN PROCESS OF FOOTWEAR  
- Basics of Footwear Design, 7 ECTS  
- Basic Knowledge of Last, Materials and Pattern Cutting, 6 ECTS  
- Pattern of Footwear and Manufacturing, 9ECTS |
| **Other information which are relevant for K4F project** | The Design degree represents 240 credits. Previous design know-how studies are taken into account, so that your studies can also be completed in an accelerated 24/7 studying ways. The examination consists of modules, with 15 credits each. Each module contains the selected studies according to the study path, which is done in collaboration work. In addition, studies include in the training dimension |
30 credits and 15 credits of thesis. The studies aim at mastering the entire design and manufacturing process of the product, with a customer orientated approach and understanding the importance of economic and ecological standpoints in the design process. The students gain expertise in the materials of their design field and product-specific quality requirements. The studies include projects in cooperation with entrepreneurs in these fields. Therefore, the curriculum is very much orientated to industry, business and entrepreneurship.

### MA FOOTWEAR - UNITED KINGDOM

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>University of the Arts London - London College of Fashion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.arts.ac.uk/fashion/courses/postgraduate/ma-fashion-footwear/#">http://www.arts.ac.uk/fashion/courses/postgraduate/ma-fashion-footwear/#</a></td>
</tr>
</tbody>
</table>

#### Level /Qualification. Entry requirements

- Postgraduate
- Requirements:
  - An Honours degree at 2.1 or above in footwear design and/or production. Applicants with a degree in another subject may be considered, depending on the strength of the application,
  - Equivalent qualifications,
  - Relevant and quantitative industrial experience for a minimum of three years.
- Selection for interview will be made on the basis of your application, including the personal statement, the reference, a digital portfolio, the supporting written assignment and project proposal. If you are selected for interview you will be asked to bring a portfolio of previous work, including developmental work where possible, and three footwear products you have made to evidence your skills.

<table>
<thead>
<tr>
<th>Duration/Number of hours (per day or totally)</th>
<th>Study Mode</th>
<th>Full time or Part time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Length</td>
<td>15 months (Full time) or up to 5 years (Flexible)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Detailed learning content (curriculum)</th>
<th>Full Time mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Term One</strong></td>
<td>Creative and Technical Innovation (40 credits)</td>
</tr>
<tr>
<td></td>
<td>Research Methods (20 credits)</td>
</tr>
<tr>
<td><strong>Term Two</strong></td>
<td>Collaborative Unit (20 credits)</td>
</tr>
<tr>
<td></td>
<td>Technical Analysis and Development (40 units)</td>
</tr>
<tr>
<td><strong>Terms Three and Four</strong></td>
<td>Masters Project (60 credits)</td>
</tr>
<tr>
<td></td>
<td>Flexible mode</td>
</tr>
<tr>
<td>The same units are taught at the same times in the year as on the full-time mode but you can complete the 20 credit units in any order and you have the option of taking longer to complete the course. You may build credits towards a Postgraduate Certificate, a Postgraduate Diploma, or a Masters. If you get offered a place on the</td>
<td></td>
</tr>
</tbody>
</table>
Flexible route your Course Leader will advise you on the best possible combination of units and when best to take them. Please note that 120 credits must be successfully completed before the Masters Project is started. The Masters must be completed within five years.

<table>
<thead>
<tr>
<th>POSTGRADUATE CERTIFICATE FOOTWEAR: PRODUCTION AND MANUFACTURE- UNITED KINGDOM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning provider</strong></td>
</tr>
<tr>
<td><strong>Website</strong></td>
</tr>
<tr>
<td><strong>Level /Qualification. Entry requirements</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | **Unit One:** Design and Technical Processes (20 credits)  
**Unit Two:** Production and Manufacturing Techniques (20 credits)  
**Unit Three:** Independent Research Project (20 credits) |
| **Other information which are relevant for K4F project** | This course is also suitable for individuals who wish to change career and learn the basics of footwear design, production and manufacture. |
### Annex 1.2

Training courses for footwear industry addressing designers, managers and engineers/technicians.

### FOOTWEAR FUNCTIONAL ANALYSIS

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td>Level/Qualification. Access requirements</td>
<td>Aimed at footwear manufacturers, quality control technicians, footwear designers</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| Detailed learning content (curriculum) | • Footwear functional analysis  
• Functional analysis methodologies  
• Dynamic and kinematic analysis  
• Plantar pressure distribution  
• Contact surfaces analysis  
• Digitising  
• Technical applications for footwear improvement  
• Practical exercises using functional analysis equipment |

### FOOTWEAR CERTIFICATION

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td>Level/Qualification. Access requirements</td>
<td>Aimed at footwear manufacturers, quality control technicians, technicians in occupational risk prevention</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| Detailed learning content (curriculum) | • Personal Protective Equipment identification  
• Harmonised standards on footwear for professional use Analysis of essential and additional requirements  
• CE marking ad labelling of footwear  
• Required documentation for CE marking  
• Tests related to comfort and European regulations on foot and leg protection |
<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Aimed at chemists and finished-products and coating materials formulators, technicians and engineers of footwear and footwear materials manufacturing companies</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | • What is micro-encapsulation?  
• Microcapsules properties  
• Controlled release of active substances  
• Addition of microcapsules to footwear materials  
• Characterisation of materials containing microcapsules |

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Footwear technicians, quality control technicians</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | • Fundamentals of hotmelt adhesives  
• Types of hotmelt adhesives  
• Uses and advantages vs disadvantages  
• Formulation and characterisation of hotmelt adhesives  
• Application of hotmelt adhesives in footwear |

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Experienced footwear designers and stylists. Young designers with high artistic and creative aspirations who are interested in implementing cool hunting techniques for the creation of FOOTWEAR COLLECTIONS</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>4 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | • Coolhunting anatomy  
• Terminology and basic concepts  
• Methodologies, sources and resources  
• Research process: detecting, identifying and analysing  
• Trends boards; inspiration, translation and immersion |
### SIZE MARKING

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Shoemakers, last-makers, footwear quality control technicians</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>4 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | - International regulations on size marking  
- Sizing systems review. Existing problems  
- Conversion tables of children’s sizing systems and adults’ sizing systems  
- Practical exercises: What size do I wear? |

### CARBON FOOTPRINT: ENVIRONMENTAL IMPROVEMENT FOR FOOTWEAR

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Aimed at technicians in charge of environmental issues</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | - Life cycle analysis  
- Types of carbon footprint  
- How to calculate the carbon footprint?  
- Benefits and applications |

### NON-SLIPPING FOOTWEAR

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Footwear quality control technicians, soles and footwear designers</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | - Slipping assessment in footwear  
- Applicable regulations  
- Factors influencing footwear grip  
- Recommendations on improving grip  
- Slip resistance test |
### REACH IN FOOTWEAR

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Aimed at footwear technicians, quality control technicians</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** |  - Introduction to the REACH Regulation  
  - Substances of very high concern (SVHC)  
  - Substances subject to authorisation  
  - Restricted substances  
  - Information throughout the supply chain |

### ANTIMICROBIAL AGENTS. EFFICACY IN FOOTWEAR

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>INESCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://inescop.es/formacion/">http://inescop.es/formacion/</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Aimed at footwear technicians, quality control technicians</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>2 hours</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** |  - Mechanisms of action of antimicrobial agents  
  - Microorganisms  
  - Microbiological tests on footwear  
  - General antimicrobial tests  
  - Antimicrobial tests for the footwear industry |

### FOOTWEAR DESIGN

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>LSD – The Lisbon School of Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://lsd.pt/couro/Design_Calcado_Lisboa">http://lsd.pt/couro/Design_Calcado_Lisboa</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Access requirements</strong></td>
<td>Entrepreneurs in the footwear sector, designers in ateliers, candidates with some background in footwear (not mandatory). There’s no restricted requirement to the participation in such training, as it’s promoted by private entity and provide a private certification.</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>260 hours</td>
</tr>
</tbody>
</table>
| **Objectives of the course** |  - To offer a training programme comprehensive and able to respond to the footwear sector needs, developing skills in future designers, with resource to practical training.  
  - To combine an artistic conceptual base with the technical base, comprehending the initial scratch till the prototyping. |
Detailed learning content (curriculum)

- History of Fashion
- Types of footwear: men, ladies, children
- Types of footwear: classic, casual, sportive, street shoes, events
- Fashion and design culture: designers, brands, icons, references
- The iconic brands and their strategic positioning
- Anatomy of the foot and of the shoe
- Types of gaits
- Anatomic design
- Illustration: manual and digital tools of representation and illustration
- Product engineering tools 2D
- Product engineering tools 3D
- Components and accessories
- Types of construction and assembling
- Materials: leather, textile, synthetics
- Types of soles
- General aspects of manual pattern making and computer assisted patter making
- Methodology of project and project management
- Preparation for the collection
- Research of trends
- Theory of colour
- Research of materials, components and accessories
- Textures and pattern
- Final project: development of a collection till prototyping
- Product budgetary
- Marketing approach, communication and promotion
- Graphic design – notions
- Design of identity and packages – notions
- Final presentation of the collection

Other relevant information for K4F project

During the course some software to support the footwear design are used such as MindCad which allow a photo realistic representation of the footwear model, the quick prototyping of the model in 3D printing, the conversion and planning of the model in 2D, the scaling, the digitalisation and the application of materials, soles, accessories, etc. The course was conceived to be targeted to all of those who have a footwear background and motivation to develop creative and conceptual thinking and technical capacity in the development of footwear collections.
### STORAGE, LABELLING AND HANDLING OF CHEMICAL SUBSTANCES

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>CTCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.ctcp.pt">www.ctcp.pt</a></td>
</tr>
<tr>
<td>Level /Qualification. Access requirements</td>
<td>Professionals, technicians, all those who handle chemical substances</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>4 hours</td>
</tr>
</tbody>
</table>
| Objectives of the course | The course aims at enabling people from companies to correctly storage and handle chemical substances, preserving physical integrity of all and security. At the end of the training, the trainee should be able to:  
- To understand the risks of handling chemical substances  
- To implement good practices in the handling of chemical substances  
- To know and understand the symbols and labelling of chemical substances  
- To interpret technical sheets of security data  
- To use properly the protection equipment  
- To recognise secure condition of storage  
- To act in case of accident |
| Detailed learning content (curriculum) | • What is a chemical substance  
- Risks in the use of chemical substances  
- Good practices in their handling  
- Classification of dangerous chemical substances  
- Labelling of the packages  
- Security data technical sheets  
- Individual protection equipment  
- Storage of chemical substances  
- Types of accidents, its prevention and how to act in case of accident  
- Hygiene specific cares |

### FOOTWEAR QUALITY CONTROL

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>CTCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.ctcp.pt">www.ctcp.pt</a></td>
</tr>
<tr>
<td>Level /Qualification. Access requirements</td>
<td>Professionals, technicians, quality controllers, production responsible, others</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>35 hours</td>
</tr>
</tbody>
</table>
| Objectives of the course | The course aims at developing technical knowledge on footwear from the development till production and expedition, focusing on the materials processes, new technologies and Quality control techniques. At the end of the training, the trainee should be able to:  
- Recognise and understand the materials, components, their behaviour facing different process variables. |
• Understand the footwear manufacturing process
• Understand and apply quality control techniques, according to the specificity of the product, company and consumers
• Apply traceability techniques
• Elaborate and complete quality control plan charts
• Apply techniques of selection, assess and classify subcontracted (suppliers)
• Decide on the type of test to do or to ask to be done in a certified laboratory
• Understand and interpret the results
• Identify the most usual problems, correspondent causes and consequences and to draft corrective and preventive measures.

**Detailed learning content (curriculum)**

<table>
<thead>
<tr>
<th>Detailed learning content (curriculum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Generically approach to footwear materials, components and manufacturing process</td>
</tr>
<tr>
<td>• Technology of materials</td>
</tr>
<tr>
<td>• Technology of processes</td>
</tr>
<tr>
<td>• Quality control: defects and their assessment/classification; some quick tests</td>
</tr>
<tr>
<td>• Quality laboratory control tests: Standards, visualisation of the tests and interpretation of the results</td>
</tr>
<tr>
<td>• Quality Control procedures</td>
</tr>
<tr>
<td>• Claim analysis, corrective and preventive measures.</td>
</tr>
</tbody>
</table>

**Other relevant information for K4F project**

The project can be tailored to the most fined need of the companies.

### QUALITY CONTROL LABORATORY TESTS

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>CTCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.ctcp.pt">www.ctcp.pt</a></td>
</tr>
<tr>
<td>Level /Qualification. Access requirements</td>
<td>Professionals, technicians, quality controllers, production responsible, others, laboratory control technicians</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>16 hours</td>
</tr>
<tr>
<td>Objectives of the course</td>
<td>The course aims at developing technical knowledge and abilities to perform quality control tests in Laboratory according to standards and procedures, prepare reports, interpret the results and plan corrective and preventive measures. At the end of the training, the trainee should be able to:</td>
</tr>
<tr>
<td></td>
<td>• Apply the due techniques to perform Laboratory control tests according to specific standard in Finished footwear, materials, components and footwear in progress.</td>
</tr>
<tr>
<td></td>
<td>• Understand and interpret the results</td>
</tr>
<tr>
<td></td>
<td>• Prepare reports</td>
</tr>
<tr>
<td></td>
<td>• Identify the correspondent causes and consequences and to draft corrective and preventive measures.</td>
</tr>
</tbody>
</table>
### Detailed learning content (curriculum)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrective and Preventive Measures</td>
<td>Corrective and Preventive Measures</td>
</tr>
<tr>
<td>Brief rules of HSW in laboratories</td>
<td>Procedure for each test: standards (if exist), equipment, methods, reference values</td>
</tr>
<tr>
<td>Procedure for each test: standards (if exist), equipment, methods, reference values</td>
<td>Visualisation and practical experimentation of the tests</td>
</tr>
<tr>
<td>Visualisation and practical experimentation of the tests</td>
<td>Preparation of a report</td>
</tr>
<tr>
<td>Preparation of a report</td>
<td>Interpretation</td>
</tr>
</tbody>
</table>

### Other relevant information for K4F project

The project can be tailored to the specific needs of the companies, if the company has indoor lab, what kind of equipment.

### FOOTWEAR EXPERTISE

**Learning provider**
The International Shoe Competence Centre, ISC Germany

**Website**
http://www.isc-germany.de/

**Level /Qualification. Entry requirements**
This seminar is aimed at anyone who wants to work with the product "Shoe", but has no shoe background. For example, employees and sales departments, as well as to newcomers in trade and industry.

**Duration/Number of hours (per day or totally)**
3 days / 6.30 hours daily

**Detailed learning content (curriculum)**
- Base shoe development: production, features
- Anatomy of the foot and influence of footwear: Anatomical structure of the foot, the walk to bars, fit, influence of footwear on posture and gait, measuring systems.
- Shoe styles: walking shoes, Work and safety shoes, children's and sports shoes.
- Longitude and Weitenmaßsysteme: English Sizes and French stitch, Mondopoint, WMS.
- Recognizing the different Macharten: Flexible, California, San Crispino, AGO etc.
- Selecting upper materials (practical exercises): Identify the most common types of leather, fabrics and breathable membrane (GORE-Tex, Sympatex ..), Other shaft materials, quality assessments.
- "From the idea to shoe" (practical part): collection design, Design drawing, 3D designs, "cap", detailing the template.
- Trimming and cutting parts (practical exercises): Process operations and their importance.
- Using adhesives (practical exercises): Handling and use of various types of adhesives and solvents.
- Yarns and threads, seam types (holding seams and topstitching), Needle types and their use.
- The nature and characteristics of the materials, Preparations for lasting, Preparations of soles and sole materials.
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**PROJECT 2015-1-RO01-KA203-015198**

| **Finishing** | • Materials and their properties • Use of polishing brushes |

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**SHOE DESIGN WITH ADOBE PHOTOSHOP**

| Learning provider | The International Shoe Competence Centre, ISC Germany |
| Website | http://www.isc-germany.de/ |
| Level /Qualification. Entry requirements | No experience is necessary. |
| Duration/Number of hours (per day or totally) | 3 days / 6.30 hours daily |
| Detailed learning content (curriculum) | **Introduction.** - Presentation, Course Objectives  
  • **Shoe Copy.** Shoe Import photos, arrange and indemnify. trademarks remove or change • Design and colour change  
  • **Preparation of a photo-realistic designs.** Digitisation / procurement of materials / procurement of materials and details. Creating textures. Cropping Details  
  • **creation of a parametric 2D designs with Photoshop.** Import / Creating vectors • use of vector masks • use realistic looking textures • 3D effects for realistic edges and textures to create and use • Brush • eyelets and other Indemnified Details Apply • Spatial representation of light and shadow  
  • **production with Photoshop.** • Background and foreground • strokes and effects. • Questions, Feedback |

**Other information which are relevant for K4F project**

This course provides a training in how to create photorealistic 2D parametric designs with Photoshop. Using examples from practice, the participants will learn the basic and some advanced features of Adobe Photoshop programme know. Existing designs can be transformed from Photoshop into something new using. Starting from a line drawing also allows Photoshop professional photorealistic design a shoe model and a production in the desired style. In addition to this seminar it is recommended the course "Shoe Design with Adobe Illustrator".

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**SHOE DESIGN WITH ADOBE ILLUSTRATOR**

| Learning provider | The International Shoe Competence Centre, ISC Germany |
| Website | http://www.isc-germany.de/ |
| Level /Qualification. Entry requirements | Students will learn the basic functions of Adobe Illustrator by means of practical application of programmes to know step by step. The focus is on facilitating known creative processes. No experience is necessary. Participants are asked to bring a black and white line drawing. |
| Duration/Number of hours (per day or totally) | 2 days / 6.30 hours daily |
### Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**Detailed learning content (curriculum)**
- Drawing
- Vectorisation and dyeing

**Other information which are relevant for K4F project**
The aim is to be able to independently get started with Illustrator by the two course days. Working with digital visualised designs not only saves development costs for sample preparation and model, but also shorten decision-making processes and facilitates the collection design to the creation of marketing concepts. The Adobe Illustrator programme is well suited for perfect line drawings and quick colour illustrations.

---

### MASTERING FOOTWEAR

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>University of the Arts London - London College of Fashion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level /Qualification. Entry requirements</td>
<td>Beginners. You should have an interest in footwear making and a desire to learn but no previous experience is required.</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>Saturdays from September to July</td>
</tr>
</tbody>
</table>
| Detailed learning content (curriculum) | • Introduction to footwear pattern cutting,  
• foot anatomy, size fitting systems and last measurements contemporary lasts  
• Practical learning:  
• Making a court shoe:  
• Making a flat sandal/high heel:  
• Making a loafer, court shoe or sandal: |

At the end of the course the students leave with three pairs of shoes and a comprehensive set of reference notes and supporting patterns.

The course includes the following techniques:
- Explanation of specialist equipment and machinery and treatments which may be achieved  
- Basic understanding of terminology and foot anatomy  
- Drawing onto the last  
- Last taping  
- Making an inside and outside/ mean form and design standard  
- Closing (stitching the upper)  
- Preparing the insole  
- Lasting (shaping the leather)  
- Attaching the sole and the heel
## FOOTWEAR SUMMER SCHOOL

<table>
<thead>
<tr>
<th><strong>Learning provider</strong></th>
<th>University of the Arts London - London College of Fashion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/shoe-making-summer-school/#">http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/shoe-making-summer-school/#</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Entry requirements</strong></td>
<td>Beginners. You should have an interest in footwear making and a desire to learn but no previous experience is required.</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>25 days.</td>
</tr>
</tbody>
</table>
| **Detailed learning content (curriculum)** | • Introduction to footwear pattern cutting, foot anatomy, size fitting systems and last measurements contemporary lasts  
• Practical learning  
• Making a court shoe  
• Making a flat sandal/high heel  
• Making a loafer, court shoe or sandal  
At the end of the course the students leave with three pairs of shoes and a comprehensive set of reference notes and supporting patterns. The course includes the following techniques:  
• Explanation of specialist equipment and machinery and treatments which may be achieved  
• Basic understanding of terminology and foot anatomy  
• Drawing onto the last  
• Last taping  
• Making an inside and outside/ mean form and design standard  
• Closing (stitching the upper)  
• Preparing the insole  
• Lasting (shaping the leather)  
• Attaching the sole and the heel |
| **Other information which are relevant for K4F project** | Summer schools are attractive for students |

## FOOTWEAR DESIGN: INTENSIVE

<table>
<thead>
<tr>
<th><strong>Learning provider</strong></th>
<th>University of the Arts London - London College of Fashion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/shoe-design-course-intensive/#">http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/shoe-design-course-intensive/#</a></td>
</tr>
<tr>
<td><strong>Level /Qualification. Entry requirements</strong></td>
<td>Beginners. You should have an interest in the subject area and a desire to learn but no previous experience is required.</td>
</tr>
<tr>
<td><strong>Duration/Number of hours (per day or totally)</strong></td>
<td>2 weeks, from Monday to Friday, 6.5 hours/day; 65 hours in total</td>
</tr>
</tbody>
</table>
### Detailed learning content (curriculum)
- Trend research and analysis
- How to develop your design ideas
- Creating customer profiles
- Design development process
- Story/mood boards
- Range building
- Decoding trends and fashion predictions
- Production awareness

### INTRODUCTION TO FOOTWEAR DESIGN

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>University of the Arts London - London College of Fashion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/shoe-design-course/#">http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/shoe-design-course/#</a></td>
</tr>
<tr>
<td>Level /Qualification Entry requirements</td>
<td>Beginners. You should have an interest in the subject area and a desire to learn but no previous experience is required.</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>6.5 hours/day; 5 days, Total= 32.5 h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Detailed learning content (curriculum)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How to develop your design ideas</td>
</tr>
<tr>
<td></td>
<td>Visual communication and illustration skills through traditional skills and digital design</td>
</tr>
<tr>
<td></td>
<td>Design development process</td>
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<tr>
<td></td>
<td>Story/mood boards</td>
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<tr>
<td></td>
<td>Range building</td>
</tr>
<tr>
<td></td>
<td>Decoding trends and fashion predictions</td>
</tr>
</tbody>
</table>

**Other information which are relevant for K4F project**

Drawing and presentation will be covered in a series of technical workshops.

### UNDERSTANDING LEATHER

<table>
<thead>
<tr>
<th>Learning provider</th>
<th>University of the Arts London - London College of Fashion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td><a href="http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/understanding-leather/#">http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/understanding-leather/#</a></td>
</tr>
<tr>
<td>Level /Qualification Entry requirements</td>
<td>Beginners. You should have an interest in the subject area and a desire to learn but no previous experience is required</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>7 hours; 1 day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Detailed learning content (curriculum)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Selecting appropriate leathers</td>
</tr>
<tr>
<td></td>
<td>Diversity of leather from stretch to exotic grains</td>
</tr>
<tr>
<td></td>
<td>Leather sourcing, terminology</td>
</tr>
<tr>
<td></td>
<td>Impact of technology on finishing techniques</td>
</tr>
<tr>
<td></td>
<td>Trends in leather</td>
</tr>
<tr>
<td></td>
<td>Quality and price of leather and</td>
</tr>
<tr>
<td></td>
<td>Studying samples to gain an understanding of the different skins and hides</td>
</tr>
<tr>
<td>Learning provider</td>
<td>University of the Arts London - London College of Fashion</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/start-a-footwear-business/#">http://www.arts.ac.uk/fashion/courses/short-courses/footwear-courses/start-a-footwear-business/#</a></td>
</tr>
<tr>
<td>Level /Qualification. Entry requirements</td>
<td>Beginners/Intermediate. You should come to the course prepared to discuss your potential business idea.</td>
</tr>
<tr>
<td>Duration/Number of hours (per day or totally)</td>
<td>21 h; 7 h/day, 3 days</td>
</tr>
<tr>
<td>Detailed learning content (curriculum)</td>
<td>• Pros and cons of starting up independently</td>
</tr>
<tr>
<td></td>
<td>• Business structure</td>
</tr>
<tr>
<td></td>
<td>• How to get started</td>
</tr>
<tr>
<td></td>
<td>• Running a footwear/accessories fashion business in practice</td>
</tr>
<tr>
<td></td>
<td>• The fashion business plan</td>
</tr>
<tr>
<td></td>
<td>• Product and image development</td>
</tr>
<tr>
<td></td>
<td>• Understanding the fashion year plan</td>
</tr>
<tr>
<td></td>
<td>• Designing and sampling a collection through to production</td>
</tr>
<tr>
<td></td>
<td>• Sourcing specialised materials</td>
</tr>
<tr>
<td></td>
<td>• Working with manufacturers</td>
</tr>
<tr>
<td></td>
<td>• Supply chain and distribution</td>
</tr>
<tr>
<td></td>
<td>• Costings and pricing</td>
</tr>
<tr>
<td></td>
<td>• Understanding profit and loss and cash flow for a fashion business</td>
</tr>
<tr>
<td></td>
<td>• How to sell your collection to stores (e.g. trade exhibitions)</td>
</tr>
<tr>
<td></td>
<td>• Marketing and promotion</td>
</tr>
</tbody>
</table>
Annex 2

Inventory of Research, Development and Innovation (RDI) projects
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

Project Number: 2015-1-RO01-KA203-015198

Title of the project: NANOFOOT - Materials, Components and Footwear with enhanced comfort properties based on nanotechnologies

Funding organisation or program: SME-2013-1 - Research for SMEs

Country/ Partners:
- CTCP – Portugal, University of Porto – Portugal,
- INESCOP - Spain,
- NATIONAL RESEARCH COUNCIL - Italy,
- CURTUMES AVENEDA LDA – Portugal,
- INDINOR - Indistras Quimicas S.A. – Portugal,
- EVATHINK, S.L. - Spain,
- TODO PARA SUS PIES SL - Spain,
- CAMMINALEGGERO - Italy,
- INDINOR - Indistras Quimicas S.A.
- EVATHINK, S.L.
- TODO PARA SUS PIES SL
- CAMMINALEGGERO

Objectives:
To explore the potentialities and the benefits of nanoparticles (NPs) available in the market on the development of new functional materials & products.
To get differentiated, high added value and marketable materials and footwear consumer goods; that satisfy the needs and expectations of the final consumers.

Website: http://nanofoot.ctcp.pt/

Results/Relevant information for K4F project:
- New leathers and microfibers
  Bacterial and fungal resistant leather and microfibers based on nanoparticles/nanofillers. Water resistance leather.
- New composites
  Polymers and composites with thermal/electrical management properties based on nanoparticles/nanofillers. Antistatic nanocomposites implementation in the footwear industry would improve both comfort and security as they will reduce the electrostatic charges accumulation.
- Innovative Footwear
  Footwear thermal comfort. Antistatic and electrical conductive footwear. Vegan footwear for comfort fashion segments. Leather made footwear for special orthopaedic segments;
- User and environment friendly processes

Title of the project: Mobility - Preventing gait deficiencies and improving biomechanical parameters for the elderly population by designing and developing customised footwear

Funding organisation or program: UEFISCDI - Unitatea Executiva Pentru Finantarea Invatamantului Superior, a Cercetarii, Dezvoltarii si Inovarii

Country/ Partners:
- Institutul National de Cercetare-Dezvoltare pentru Textile si Pielarie - Sucursala Institutul de Cercetari Pielarie Incaltaminte (INCDTP-ICPI)
- Universitatea Tehnica "Gheorghe Asachi" Iasi (TUiasi)
- Universitatea de Medicina si Farmacie "Carol Davila" Bucuresti, Disciplina de Expertiza Medicala si Recuperare a Capacitatii de Munca (UMF)
- Universitatea Politehnica Bucuresti - Facultatea de Antreprenoriat, Ingineria si
Objectives

- Analysis of the existing pathologies (morphological and functional changes) of the elderly women feet, and the market situation on the customised footwear;
- Prototyping techniques for shoe lasts by combining 3D modeling with 3D foot scanning, and design and pattern making with CAD / CAM system to ensure correct sizing of the footwear interior shape.
- Producing and optimising the dimensional comfort and footwear function.

Website


Title of the project

DEMSHOPINSTANTSHOE - Development of a cost-effective footwear based on shape memory materials to provide an instant fitting personalisation service at the retail shop for enhancing user's comfort

Funding organisation or program


Country/ Partners

Coordinator

- INSTITUTO DE BIOMECANICA DE VALENCIA, Spain

Partners

- INDUSTRIAS DEL CURTIDO S.A., Spain
- MDB TEXINOV SAS, France
- NIMESIS TECHNOLOGY, France
- SURFACE GENERATION LTD, United Kingdom
- CALZADOS ANATOMICOS CALANA S.L, Spain
- THE UK MATERIALS TECHNOLOGY RESEARCH INSTITUTE LIMITED, United Kingdom
- CALZAMEDI S.L., Spain

Objectives

- To scale-up the range of upper materials to creating new smart textile based composites that facilitate to cover a wider footwear market segment.
- To extend the footwear women models able to be personalised in order to fulfil the target needs and increasing the commercial scope of the product-service.
- To develop the industrialisation of the product manufacturing system.
- To upgrade the novel customisation process to a pre-commercial service, adapting the required customisation shop tool to retail channel needs.
- To validate the new improvements expected, including temporary in-shop pilot testing to reach the standard specification for the product-service, as well as outlining the most profitable business exploitation through further analysis.

Website

http://www.instantshoe.com/
**Title of the project** | DEMOULTRAGRIP. Implementation of high grip designing tools
---|---
**Funding organisation or program** | VII PROGRAMA MARCO - RESEARCH FOR SMEs (CRAFT) 
FP7-SME-2013
**Country/ Partners** | INESCOP - Spain, Cauchos Ruiz Alejos - Spain, Kopitarna - Slovenia, Base Protection - Italy,
Alu Group - Spain, ICPI - Romania
**Objectives** | Currently, sole manufacturers design their models to be anti-slip using basic design criteria, often relying on their intuition and previous experience. The problem resides in the lack of design tools that can be used in the conception of footwear, which would make prototyping much cheaper, quicker and more effective in creating an answer to the friction that the shoe would be subjected to when used.
Because of this situation, ULTRAGRIP project (FP7-SME-2010-1.262413) has developed guidelines and specific software which could be used as a design tools for soles and floorings to optimise their performance in relation to slipping. Two of the main results from ULTRAGRIP project are a slip behaviour predicting software (mathematical model), and guidelines for recommendations on improving products slip resistance.
**Website** | http://www.demoultragrip.eu
**Results/Relevant information for K4F project** | The main results of the project are:
ULTRAGRIP LINE FOOTWEAR:
RUIZALEJOS: VR-NBR-ULTRAGRIP LINE y PUR- ULTRAGRIP LINE
BASEPRO: TPU- ULTRAGRIP LINE
INCDTP: TR- ULTRAGRIP LINE
KOPITARNA: VR-SBR- ULTRAGRIP LINE
ALUGROUP: On-line configurator for soles designing in order to improve slipping behaviour
INESCOP: Commercial software for design of soles and prediction of their slipping behaviour
All footwear partners: Commercial guidelines and book

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<table>
<thead>
<tr>
<th>Title of the project</th>
<th>MICROTAN. Recovery of tannery wastes for functional microencapsulated products</th>
</tr>
</thead>
</table>
| **Funding organisation or program** | PROGRAMA LIFE+ 
LIFE12 ENV/ES/000568 |
| **Country/ Partners** | INESCOP-Spain, C.G.S. di Coluccia Michele & C. sas-Italy |
| **Objectives** | Tanning processes generate significant volumes of by-products and waste materials and, therefore, tanneries can cause serious negative environment impacts. The advancement of |
European policy and legislation protecting the environment has prompted to transform tannery solid waste materials to valuable co-products, useful to be recycled or employed in other industries. Examples of solutions that have been proposed for untanned wastes are the preparation of organic fertilisers, production of biomaterials, gelatines or collagens and the production of biofuel.

In this sense, MICROTAN focuses in the recovery in situ of collagen and gelatines from nontanned wastes. Gel-forming properties of gelatine are the basis of classical applications in food, photographic, cosmetic and pharmaceutical industries. Recently, new applications have arisen, such as their use as microencapsulating agents, which is the general project objective, in line with the growing need of functional materials for life quality improvement, as well as the increasing trend to replace raw materials from fossil sources with more natural ones. Laboratory trials made by INESCOP have demonstrated that an optimisation of the extracting conditions of collagen and gelatine is necessary in order to obtain specific properties suitable to their use as shell forming biopolymer of microcapsules.

Therefore, the main objective of MICROTAN is to demonstrate, on a semi-industrial scale, the technical, environmental and financial feasibility of the isolation of protein products like collagen and gelatine with specific properties from tannery solid wastes, in order to reuse them as natural microencapsulating agents in the production of active materials with functional properties.

The project will be co-ordinated by INESCOP which will be in charge of the technical and managerial aspects of the project, as well as dissemination of results in Europe, including the Demonstration Plant.

<table>
<thead>
<tr>
<th>Website</th>
<th><a href="http://microtan.eu">http://microtan.eu</a></th>
</tr>
</thead>
</table>

**Results/Relevant information for K4F project**

The development of LIFE microTAN project is expected to lead to the following results:
A procedure of recovery of untanned solid wastes from tanneries will be available. As a result of the implementation of the proposed recovery procedure, the valorisation as gelatine and collagen products of 15% of untanned solid waste generated in European tanneries is expected. The previous achievement will mean a foreseen reduction of about 10% of waste transportation, what will redound to a reduction in the CO$_2$ emissions. As a consequence, a reduction of the environmental costs of the tanneries is forecasted. Last, but not least, valuable by-products will be obtained, which will provide the tanneries with new niche opportunities.
**Title of the project**  |  SHOEBAT. Promotion of best available techniques in the European footwear and tanning sectors  
---|---  
**Funding organisation or program**  |  LIFE+ PROGRAMM  
 |  LIFE12 ENV/ES/000243  
**Country/ Partners**  |  INESCOP-Spain, C.G.S. di Coluccia Michele & C. sas-Italy, INSTYTUT PRZEMYSLU SKORZANEGO-Poland  
**Objectives**  
The project SHOEBAT has been designed with the aim of increasing the knowledge and application of the most environmentally friendly techniques within the footwear and tanning industries. In order to achieve this, the SHOEBAT project aims to create an interactive tool that gathers the most environmentally friendly methods so that they can be applied both in the tanning and in the footwear sector. In addition, the project intends to improve the environmental situation of tanneries and footwear companies through the promotion and demonstration of the most environmentally friendly techniques.  
The development of the project will lead to the achievement of the following objectives:  
- To promote the use of the most environmentally friendly techniques in two industrial sectors (tanning and footwear).  
- To raise environmental awareness among tanneries and footwear manufacturers.  
- To improve the environmental situation of European tanneries and footwear companies.  
- To spread the use of the tool among the European tanneries and footwear manufacturers.  
The project will be developed in three countries (Spain, Italy and Poland). However, the results drawn from the project will be spread beyond the three participating countries so as to give the project a European scope. Thus, the project has been conceived with the aim of making the tool easily available to the two sectors addressed in Europe.  
**Website**  |  http://www.life-shoebat.es  
**Results/ Relevant information for K4F project**  
Expected results.  
The creation of an interactive tool that incorporates the most environmentally friendly techniques from two industrial sectors - tanning and footwear.  
The use of this tool among European tanneries and footwear manufacturers.  
Increased interest in environmentally friendly techniques in the footwear and leather industries; and  
Environmental improvements in footwear companies and tanneries.
<table>
<thead>
<tr>
<th><strong>Title of the project</strong></th>
<th>SMARTPIF. Smart tools for the prescription of orthopaedic insoles and footwear</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or program</strong></td>
<td>VII PROGRAMA MARCO - RESEARCH FOR SMEs (CRAFT)</td>
</tr>
<tr>
<td><strong>Country/ Partners</strong></td>
<td>Alu Group - Spain, Biomech Technologies International Ltd. – United Kingdom, Eurosoule s.p.a. – Italy, Lion Systems S.A. – Luxembourg, INESCOP – Spain, University of Salford – United Kingdom, Universitat de València – Spain, Università Politecnica delle Marche - Italy</td>
</tr>
<tr>
<td><strong>Objectives</strong></td>
<td>In order to help and support practitioners to prescribe orthotic footwear and insoles, this project aims the development of a set of technological devices and computer tools that will assist them in achieving the best therapeutic prescription for their patients. The SMARTPIF system will: Collect morphological and biomechanics data on the feet of individual patients, Predict foot pressure on all areas of the foot during gait for different footwear designs, Integrate the pressure predictions with easy to operate insole design software, Enable patient to try-on in a virtual way their footwear choices.</td>
</tr>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.smartpif.eu">http://www.smartpif.eu</a></td>
</tr>
</tbody>
</table>
| **Results/Relevant information for K4F project** | To achieve the project objectives, the system developed within this project will include the following tools:  
A 4D Foot Scanning Device to scan the patient’s foot and obtain its geometrical description against time, during the gait cycle. This will complement the static 3D foot scanners, which lack information on foot deformation during the gait cycle.  
An Insole Production Software, that will allow the practitioners to design the insole, selecting the materials and drawing or selecting the different forms and structures. This design will be parameterised in a set of compliant data, not only to offer the possibility of using automatic tools for the manufacture of the insole but going further and providing a data description of the insole that will be feed in the Foot Pressure Predictor software, in order to analyse the influence of the proposed design on the exerted pressures under the plantar surface of the foot.  
A Foot Pressure Predictor software, that will predict pressure over any point of the foot plant when a specific combination of shoe and insole is selected for the patient, in order to analyse the mechanical comfort of footwear + insole. This software will be comprised of a mathematical model that will pre-calculate the pressure over the scanned foot of the patient, based on the pressure predictions that will be made by means of an Artificial Neural Network (ANN).  
A 3D Pressure Visualisation software that, according to the shoe selected made from an interactive catalogue and the insole either selected from the same catalogue or prepared by the insole production software, will show a three-dimensional model of the patient’s foot with a superimposed image corresponding to the different pressure levels predicted by the mathematical model for this particular combination of foot-shoe-insole.  
A Virtual Mirror, 3D visualisation software for a model of the selected shoe, that will be superimposed onto the real image of the patient by means of augmented reality (AR) visualisation techniques.  
The full system integrating the aforementioned results: SMARTPIF. |
<table>
<thead>
<tr>
<th><strong>Title of the project</strong></th>
<th><strong>High Speed Shoe Factory</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or program</strong></td>
<td>COMPETE – National program</td>
</tr>
<tr>
<td><strong>Objectives</strong></td>
<td>To conceive, develop and implement a new model of shoe factory which is able to provide a response for an order in 24 hours, oriented to a production pair/pair, without stocks, to on-line, and to the quick production of samples. This model is based on a logic of unique production line, of a total flexibility and total polyvalence.</td>
</tr>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.ctcp.pt/inovacao">www.ctcp.pt/inovacao</a></td>
</tr>
<tr>
<td><strong>Results/Relevant information for K4F project</strong></td>
<td>New organisational model in a unique production flow, in substitution of the traditional production rooms such as cutting, stitching, assembling. Automatic distribution system including automatic cutting system. On-line control system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Title of the project</strong></th>
<th><strong>CONTRIBUTIONS TO FOOTWEAR SUSTAINABILITY – NEW BIODEGRADABLE MATERIALS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or program</strong></td>
<td>COMPETE – National Programme</td>
</tr>
<tr>
<td><strong>Country/ Partners</strong></td>
<td>CTCP – Portugal, ANC – António Nunes de Carvalho S.A. - Portugal, COMFORSYST S.A. - Portugal, CTIC – Portugal, IST – UNL – Universidade Nova de Lisboa - Portugal</td>
</tr>
<tr>
<td><strong>Objectives</strong></td>
<td>A significant percentage of consumers are sensitive to environmental aspects and would buy a product that incorporates materials from natural and renewable origin, metal free or biodegradable, that are produced by sustainable processes. If the prices are similar or without major discrepancies, the consumer chooses the more environmentally friendly products. These trends create market opportunities for the footwear and allied trade partners and motivate studies focusing the leather production cycle, starting from raw materials selection, passing by tanning and re-tanning, to dyeing and finishing resulting in the development of a wet-white metal free.</td>
</tr>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.ctcp.pt/inovacao">www.ctcp.pt/inovacao</a></td>
</tr>
<tr>
<td><strong>Results/Relevant information for K4F project</strong></td>
<td>Different formulations for wet-white tanning and wet-end processes, tuning the best combination of formulations in order to obtain the optimised biodegradable leather product and testing the materials based in ISO standards. The products present physicalresistance allowing their application ton a vast range of footwear products and footwear production at industrial scale was proven.</td>
</tr>
</tbody>
</table>
### SHOE-ID - RFID APPLIED TO SHOE PRODUCTION, DISTRIBUTION AND SALES CHAIN

**Title of the project**
SHOE-ID - RFID APPLIED TO SHOE PRODUCTION, DISTRIBUTION AND SALES CHAIN

**Funding organisation or program**
ON2 + COMPETE + QREN + UE

**Country/ Partners**

**Objectives**
The project Shoe ID consists in the conception, development and implementation of a new organisational concept oriented to the value chain, since the production systems, storage centres, distribution nets, commercial shops, through the incorporation of RFID technologies articulated with new models for prevision, new models of optimisation, and new technologies of interactivity inside the shoe shoe of the future and showrooms. The objectives is the “zero paper” trend, within the production flow, the total and easy traceability of the product, increase effectiveness in the decision making and management.

**Website**
www.ctcp.pt/inovacao
http://www.ctcp.pt/galeriamedia/galeriadesc.asp?site=yes&opcao=2&id=NDQw

**Results/Relevant information for K4F project**
Concept, equipment, procedures
To explore at the level of shoe shop interactivity

### BE NATURE – DISINTEGRABLE LEATHER IN COMPOSTING CONDITIONS

**Title of the project**
BE NATURE – DISINTEGRABLE LEATHER IN COMPOSTING CONDITIONS

**Funding organisation or program**
ON2 + COMPETE + QREN + UE

**Country/ Partners**
CTCP – Portugal, CTCP (Footwear Technological Centre), CTIC (Leather Technological Centre), COMFORSYST (Portuguese SME – Fashion and Comfort Footwear designers, manufacturers and commercialisation), ANC (Portuguese SME - leather manufacture and commercialisation), VEGA Industries (Portuguese SME – Footwear components)

**Objectives**
The main objective is to develop biodegradable leather with minor impact to the environment to be introduced into the market, and also different types of footwear made with this eco-friendly leather.

The research project “Be Nature” was set up, aiming at developing biodegradable and affordable leather, components and footwear. As part of the “Be Nature” project disintegrable leather in composting conditions to be incorporated in the shoes, such as in exterior leather, outer lining and insoles was developed. As proved by tests based on the method described in the ISO 20200:2004 standard, after 21 days in composting conditions this type of leather is completely disintegrated. This leather could be used in all types of day to day casual and fashion footwear used in normal conditions.
**Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing**

**PROJECT 2015-1-RO01-KA203-015198**

<table>
<thead>
<tr>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.ctcp.pt/galeriamedia/galeriadesc.asp?site=yes&amp;opcao=2&amp;id=NDQw">Link</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results/Relevant information for K4F project</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Disintegrable leather according to ISO 20200:2004 standard, which reveals good performance and resistance suitable for use in footwear;</td>
</tr>
<tr>
<td>• Clean tanning process;</td>
</tr>
<tr>
<td>• New composting process;</td>
</tr>
<tr>
<td>Expeditious method to measure the biodegradability</td>
</tr>
</tbody>
</table>

This new leather was developed for incorporation in footwear, but can also be used in several industries, such as: automotive, furniture, clothing, aviation. The line of products, designated BioNature, is composed of a range of leather is already in the market by company tannery António Nunes de Carvalho, SA (ANC).

<table>
<thead>
<tr>
<th>Title of the project</th>
<th>NEWALK - MATERIAIS, COMPONENTES E TECNOLOGIA PARA CALÇADO DO FUTURO</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Funding organisation or program</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPETE – National Programme</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country/ Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>- CTCP - CENTRO TECNOL. DO CALCADO DE PORTUGAL</td>
</tr>
<tr>
<td>- CEI - COMPANHIA DE EQUIP. INDUSTRIAIS, LDA</td>
</tr>
<tr>
<td>- INESC PORTO- INST. DE ENG. DE SIST. E COMPUTAD.</td>
</tr>
<tr>
<td>- PIEP ASSOC - POLO DE INOVACAO EM ENGª DE POLIMEROS</td>
</tr>
<tr>
<td>- FACULDADE DE CIENCIAS-UNIV.DO PORTO</td>
</tr>
<tr>
<td>- INSTITUTO POLITÉCNICO DE BRAGANÇA</td>
</tr>
<tr>
<td>- FACULDADE DE DESPORTO DA UNIV. DO PORTO</td>
</tr>
<tr>
<td>- ACO-FAB.DE CALCADO, S.A.</td>
</tr>
<tr>
<td>- J.SAMPAIO &amp; IRMAO,LDA.</td>
</tr>
<tr>
<td>- EXPANDINDUSTRIA -E.P.G.E.,S.A.</td>
</tr>
<tr>
<td>- PROCALCADO-PROD. DE COMP. P/ CALCADO,S.A.</td>
</tr>
<tr>
<td>- INDINOR - IND. QUIMICAS, S.A.</td>
</tr>
<tr>
<td>- AS INDUSTRIA DE CALCADO, LDª</td>
</tr>
<tr>
<td>- CENTRO TECNOL. DA INDUSTRIA DO COURO</td>
</tr>
<tr>
<td>- ATLANTA-COMPONENTES P/ CALCADO, LDª</td>
</tr>
<tr>
<td>- JEFAR - INDUSTRIA DE CALCADO, S.A.</td>
</tr>
<tr>
<td>- CURTUMES AVENEDA, LDA</td>
</tr>
<tr>
<td>- INOCAM-SOL.DE MANUF. ASSIST. P/COMP. LDA</td>
</tr>
<tr>
<td>- ZIPOR-EQUIPTª E TECNOLOGIA INDUSTRIAL, LDA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project NEWALK is integrated within the footwear sector and the fashion cluster and aims at gathering a substantial number of developments in terms of materials and components to allow the production of differentiate footwear.</td>
</tr>
</tbody>
</table>

The project NEWALK includes 7 sub projects, namely: 1. NEWALK MAT – New materials,
**Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing**

1. NEWALK DEVICES – Footwear based on knowledge technology and design; 2. NEWALK TECH – Advanced technologies of production and valorisation of footwear; 3. NEWALK LOG – Flexibel logistic; 4. NEWALK QUAL Innovation in Quality control; 5. NEWALK LIFE – Comfort and healthy footwear; 6. NEWALK PROM – Promotion and dissemination.

<table>
<thead>
<tr>
<th>Website</th>
<th><a href="http://newalk.ctcp.pt/">http://newalk.ctcp.pt/</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Results/Relevant information for K4F project</td>
<td>New materials, components, technology.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Title of the project</strong></th>
<th><strong>STRESSLESSSHOE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or program</strong></td>
<td>COMPETE – National Programme</td>
</tr>
</tbody>
</table>
| **Country/ Partners** | - CTCP - CENTRO TECNOLOGIA DO CALCADO DE PORTUGAL  
- FACULDADE DE DESPORTO DA UNIVERSIDADE DO PORTO  
- J.SAMPAIO & IRMAO,LDA.  
- KLAVENESS  
- INEGI- INSTITUTO DE ENGENHARIA DE MEC. E GESTAO IND.  
- ESTSP – Escola Superior de Tecnologia da Saúde do Porto |
| **Objectives** | Stress-less Shoe project aims at developing orthopaedic devices to minimise the stress of overweight people. |
| **Website** | http://www.ctcp.pt/docs/docmediagaleria/stress-less-shoe.pdf |
| **Results/Relevant information for K4F project** | insoles, orthoses and footwear to people occasionally or permanently over weight. |

<table>
<thead>
<tr>
<th><strong>Title of the project</strong></th>
<th>Development of cost-effective and accurate computer-aided design and engineering (CAD/CAE) tools for the determination and optimisation of footwear comfort parameters (OPT-SHOES)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or program</strong></td>
<td>This research is co-financed by the European Union (European Social Fund - ESF) and Greek national funds through the Operational Programme &quot;Education and Lifelong Learning&quot; of the National Strategic Reference Framework (NSRF) - Research Funding Programme “ARISTEIA”.</td>
</tr>
<tr>
<td><strong>Country/ Partners</strong></td>
<td>University of the AEGEAN</td>
</tr>
<tr>
<td><strong>Objectives.</strong></td>
<td>This research project focuses on the development of cost-effective and accurate computer-aided design and engineering (CAD/CAE) tools for the determination and optimisation of design parameters used for the development of comfort casual and</td>
</tr>
</tbody>
</table>
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**PROJECT 2015-1-RO01-KA203-015198**

<table>
<thead>
<tr>
<th>professional footwear</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Website</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Results/Relevant information for K4F project</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Generation of algorithms for 3D foot biomechanics data processing, segmenting and modelling.</td>
</tr>
<tr>
<td>• Implementation of software modules for evaluating and optimising design parameters related to the footwear functionality.</td>
</tr>
<tr>
<td>• Generation of 3D foot models for simulating the foot-footwear interaction.</td>
</tr>
<tr>
<td>• T04: Availability of the complete solution as a service in a Cloud-Computing Environment.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th><strong>Title of the project/initiative</strong></th>
<th><strong>NanoMAPS - Low Loss Nanocrystalline Magnetic Material for High Efficiency Power Supplies</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or programme (if any)</strong></td>
<td>CCAN – Collaborative Centre for Applied Nanotechnology</td>
</tr>
<tr>
<td><strong>Country/Partners</strong></td>
<td>Tyndall National Institute, University College Cork, Cork, Ireland</td>
</tr>
<tr>
<td></td>
<td>Eisergy Limited, Dublin, Ireland</td>
</tr>
<tr>
<td></td>
<td>Nuvotem Talema, Co. Donegal, Ireland</td>
</tr>
<tr>
<td></td>
<td>Excelsys Limited, Cork, Ireland</td>
</tr>
<tr>
<td><strong>Web site (if any)</strong></td>
<td><a href="http://www.ccan.ie/research/current-projects/nanomaps/">http://www.ccan.ie/research/current-projects/nanomaps/</a></td>
</tr>
<tr>
<td><strong>Aim/Objectives</strong></td>
<td>• ‘Energy’ is identified as one of the most significant challenges for Irish society in the next decade. The aim of NanoMAPS is to address the issue of efficient energy management for electronic devices. NanoMAPS will aid with the design, engineering, technology and manufacturability of miniaturised and efficient power management systems, which will become a key building block for advanced nano-electronic components and systems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Results/Relevant information for K4F project</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TECHNOLOGIES AND EXPERTISE</strong></td>
</tr>
<tr>
<td>Tyndall’s ‘Magnetics team’ have over 15 years of experience in developing magnetic materials for on-silicon power applications. They also have expertise in development of amorphous/nanocrystalline thin film alloys for power applications.</td>
</tr>
<tr>
<td>Eisergy limited is a Dublin based Irish SME focused on advancing design and development of power conversion circuits and control.</td>
</tr>
<tr>
<td>Nuvotem Talema is a Crolly based multi-national company, with interests in designing and manufacturing transformer/inductor components.</td>
</tr>
<tr>
<td>Excelsys Technologies is the leading power supply manufacturer and designer of high efficiency, low profile power supplies for a variety of specialist markets including Industrial, Medical, Lighting, Communications and Military.</td>
</tr>
<tr>
<td>Title of the project/initiative</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td><strong>Funding organisation or programme (if any)</strong></td>
</tr>
<tr>
<td><strong>Country/Partners</strong></td>
</tr>
<tr>
<td><strong>Web site (if any)</strong></td>
</tr>
<tr>
<td><strong>Aim/Objectives</strong></td>
</tr>
</tbody>
</table>
| **Results/Relevant information for K4F project** | • Industry Impact  
• Integrated framework for assurance and accountability in cloud computing developed  
• Trust Mark process has been designed and demonstrated for (i) cloud computing and (ii) retail banking use cases with over 50 domain stakeholders participating in design process  
• Cloud Stack Monitoring System has been demonstrated  
• Cloud Services Quality Assurance system has been demonstrated  
• A Cloud Trust audit process has been developed |
Annex 3

Inventory of good practices, projects and initiatives that demonstrate the link among universities, research centres and enterprises
### Title of the project/initiative
**PRACTICA - From theory to practice**

<table>
<thead>
<tr>
<th><strong>Funding organisation or programme (if any)</strong></th>
<th>Social European Funds from the Sectoral Operational Programme for Human Resources Development 2007-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Web site (if any)</strong></td>
<td><a href="http://www.textilepraxis.ro/">http://www.textilepraxis.ro/</a></td>
</tr>
</tbody>
</table>
| **Aim/Objectives**                            | - Developing work-based skills, specific for textiles, clothing, footwear and leather goods production and research for students in technical higher education.  
- Setting up a simulated company integrating activities as in a real company: design, monitoring the manufacture, marketing and management. |
| **Results/Relevant information for K4F project** | • Involvement of over 50 companies in following activities: designing the content of practical activities; tutoring students during practical stages, assessment, etc.  
• Training of staff from companies to become tutors (46 from 29 selected companies)  
• Better selection of students after graduation for employment or for other internship stages. |

### Title of the project/initiative
**First Step to First Job – Innovative Methods Leading Youth to a Solid Career**

<table>
<thead>
<tr>
<th><strong>Funding organisation or programme (if any)</strong></th>
<th>Directorate-General for Employment, Social Affairs and Inclusion</th>
</tr>
</thead>
</table>
| **Country/Partners**                          | The National Scientific Research Institute for Labour and Social Protection, Romania  
The Research Centre of Peoples and Culture, Portugal  
The Ministry of Labour, Family, Social Protection and Elderly, Romania  
The Petroleum and Gas University from Ploiesti, Romania  
The Valahia University from Targoviste, Romania  
ÖSB Consulting GmbH, Austria  
Labour Market Strategies Consulting SRL, Romania  
Expert for Europe, Italy  
Ronsel Foundation, Spain |
| **Web site (if any)**                         | http://www.firststepfirstjob.eu/                                |
| **Aim/Objectives**                            | Objectives of the project were to stimulate the debate between different stakeholders on innovative methods for youth transition to the labour market, to disseminate the concept of the “Simulated Enterprise” and to draft recommendations for decision-makers on a smooth transition from school to work. Activities of the project involved a comparative study, study visits, workshops and an information campaign. The project targeted decision-makers and |

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**Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing**

**PROJECT 2015-1-RO01-KA203-015198**
policy implementers as well as the civil society and the university, academic and labour environments.

**Results/Relevant information for K4F project**

The project generated a knowledge base on the impact of innovative measures aiming at increasing youth employability in five EU countries: Austria, Italy, Portugal, Romania and Spain. This knowledge is helpful in answering the question to what extent the innovative measures were really making a difference on the European labour market. The project collected practical experiences of participating countries and identified best practices within the field of youth employment.

A comprehensive study issued during the project succeeded in capturing some of the most up to date and varied methods for facilitating youth insertion and mobility on the labour market, that were in force at the time in the 5 research participating countries. One of these methods is that of the “Simulated Enterprise”, which is increasingly being used by tertiary education institutions in Europe (e.g. Austria, Romania, Spain) for its truly outstanding benefits on strengthening students’ practical skills and competencies as well as grasp of real-life economic and business processes and thus enhancing their prospects for being hired at a relevant workplace.

The “Simulated Enterprise” method has a great transferability potential at EU level, and the study provides a full chapter on recommendations for design and implementation of measures to support education and the transition from school to work, as well as to avoid skills mismatches and to promote an effective and efficient development and deployment of human resources on the labour market. The project facilitated the transfer of innovative know-how on the first transition of youth from education to labour market in different Member States, and it is a good practice example of information sharing and learning between European multi-stakeholder partners in this field.

<table>
<thead>
<tr>
<th><strong>Title of the project/initiative</strong></th>
<th>European Sector Council on Employment and Skills in the Manufacturing Industry: First Year of Operation, Activities and Initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or programme (if any)</strong></td>
<td>Directorate-General for Employment, Social Affairs and Inclusion</td>
</tr>
</tbody>
</table>
| **Country/Partners** | IndustriAll – European Trade Union, replacing from May 16, 2012 the European Federation of Textile, Garment and Leather (FSE: THC)  
The Confederation of National Associations of Tanners and Dressers of the European Community, COTANCE  
European Apparel and Textile Confederation, EURATEX |
| **Web site (if any)** | http://eurpeanskills councillor.t-c-l.eu |
| **Aim/Objectives** | This project was a follow-up to four preceding projects, which paved the way for the European Sectoral Skills Council, and it aimed to launch the activities of the Council. The Council brings in more than 260 stakeholders across Europe, which were the direct target group of the project, specifically: business organisations, training and education centres, industry associations, observatories, private employment agencies, public authorities, technological platforms, consultants and unions. The project activities involved the Board meetings, research and |
reporting, involvement and awareness raising, and the final conference. During the course of the project, the Board realised that the term “observatories” used to define organisations involved in the Skills Council was inappropriate and adopted a new term “industry skills partnerships” (ISP) which applies to sector-specific bipartite or tripartite organisations active in the fields of education, training and employment in a defined geographical area.

**Results/Relevant information for K4F project**

The European social partners in the textile, clothing and leather industry were the first to establish the European Sectoral Skills Council in 2011 as a basis for an active employment policy. This project was funded to support the first year of the Council’s operation. It generated a knowledge base necessary to guide activities of the Council, specifically, information on the evolution of the supply, employment and skills, including needs foresight and prospective analysis for the sector. Good practices on reducing the mismatch of competences at the sectoral level were identified and innovative tools, national and/or regional strategies, local initiatives and methods which could be used for peer learning were identified. In addition, recommendations for policy makers and partners based on sectoral discussions were drawn.

This project is a good practice example of a consistent and well-coordinated activity of European level social partners. Their experience can be transferred to other sectors having established their European Sectoral Skills Council. It is the most advanced example so far on implementing European Strategy for New Skills and Jobs.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>Establishing a European Sector Council for Commerce on Employment and Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>Directorate-General for Employment, Social Affairs and Inclusion</td>
</tr>
<tr>
<td>Country/Partners</td>
<td>UNI EUROPA EUROCOMMERCE</td>
</tr>
<tr>
<td>Web site (if any)</td>
<td><a href="http://www.europeancommerce.eu">http://www.europeancommerce.eu</a></td>
</tr>
<tr>
<td>Aim/Objectives</td>
<td>The Social Partners in the Commerce sector – UNI Europa Commerce and Eurocommerce – have been promoting a network of relevant stakeholders with interest in Vocational Education and Training in the commerce and retail sectors already since 2010. This project was a follow-up to a feasibility phase, during which the need to constitute a Sector Skills Council emerged and the agreement between European social partners to establish the Council was reached. The aim of this project was to create and formally launch the Council and develop its infrastructure and tools. It resulted in the creation of a network of 7 observatories from 6 countries (Belgium, Denmark, France, Netherlands, Portugal and Spain) and the agreement between them on a Statute, where rules on the concrete functioning of the Council were established: its objectives, membership, duration, financing and decision procedures. The potential users of the ICT platform were also identified: sector and industrial associations, employers, universities, training providers, employees and job seekers.</td>
</tr>
<tr>
<td>Results/Relevant</td>
<td>This project led to the setup of the EU Commerce Skills Council as well as the creation of an ICT</td>
</tr>
</tbody>
</table>
infrastructure and relative tools, which will be used to link existing and emerging observatories on employment and training, improve the functioning of the Council, facilitate the exchange of best practices and competencies, and identify and monitor training needs within the sector. The EU Commerce Skills Council is the second Skills Council established at the EU level and closely following in the steps and enhancing the experience of the first one in the Textile and Leather Industry. This project is a good practice example of the formation of a European network of observatories and other labour market and skills information gathering bodies within the commerce sector with the aim of improving the level and quality of education, skills and employment in the Commerce-related industries by anticipating the future skills needs and labour shortages.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>Analysis of Feasibility of Creating European Sector Councils on Employment and Skills in the Audiovisual and Live Performance Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>Directorate-General for Employment, Social Affairs and Inclusion</td>
</tr>
</tbody>
</table>
| Country/Partners | UNI Europa (EURO-MEI) – The European Regional Organisation of Union Network International – Media, Entertainment and Arts  
European Broadcasting Union  
European Coordination of Independent Producers  
International Federation of Journalists  
International Federation of Musicians  
Performing Arts Employers’ Associations League Europe  
The International Federation of Actors |
| Web site (if any) |  |
| Aim/Objectives | The project was initiated by the European social partners and targeted stakeholders involved in education and training activities in the audio-visual and live performance sectors at the national level. The aim of the project was to analyse the feasibility of creating a European Sector Council on Employment and Skills in these sectors. To this end, the project partners carried out a mapping exercise across 27 EU countries and identified 17 national sector skills councils or equivalent bodies and other stakeholders in 10 EU countries. The majority of stakeholders clearly expressed an interest in exchanging information at the EU level. Additional information on the national employment and training landscapes was collected during study visits to 13 EU countries, and consultations on the interest and feasibility of creating a European structure were carried out.  
On the basis of the mapping exercise and the study visits, a report with recommendations for further action was drafted and put forward to the two Sector Social Dialogue Committees. The report stressed that sufficient interest and expertise were identified in the two sectors across Member States. As a result, the Committees adopted recommendations to establish a European Sector Skills Council in the audio-visual and live performance sectors. |
| Results/Relevant | This project is an example of EU social partners successfully completing a feasibility phase and |
taking an informed decision on the establishment of a European Sector Skills Council in the audio-visual and live performance sectors. Moreover, the project provided EU social partners, the Commission and all relevant stakeholders in skills development with a good overview of skills bodies and an assessment of their capacities and activities in the Member States. A database with over 400 entries across the EU was produced as well as recommendations on the possible structure, composition, mandate and scope of action for the Council.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>Network Proactive Management of Change and Restructuring (Network ProMCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>Directorate-General for Employment, Social Affairs and Inclusion</td>
</tr>
</tbody>
</table>
| Country/Partners | Association of Employers of Slovenia, Slovenia  
Association of Free Trade Unions of Slovenia, Slovenia  
BUSINESSEUROPE (pan-European)  
Confederation of Hungarian Employers and Industrialists, Hungary  
Confederation of Industry of the Czech Republic, Czech Republic  
Czech-Moravian Confederation of Trade Unions, Czech Republic  
Employment Service of Slovenia, Slovenia  
International Labour Organisation, Country Office for Central and Eastern Europe, Hungary  
Ministry of Labour and Social Affairs of the Czech Republic  
National Confederation of Hungarian Trade Unions, Hungary  
Public Employment Service of Hungary, Hungary |
| Aim/Objectives | The project targeted employer organisations, trade unions, public employment services, public authorities and European partner organisations. By analysing current and planned company restructuring strategies in Central European countries, it aimed to promote effective company decision-making on restructuring in order to optimise the competitiveness of companies in the global economy and workers’ adaptability to change. Knowledge, experience and good practices exchanged through national and transnational partnerships focused on effective management of restructuring, which would support positive and proactive approach to change. In addition, evidence on education and training policies in the companies and the role of worker’s representatives during the restructuring and change management processes was collected. It showed that many companies do not give sufficient attention to these factors, while the governments give very poor financial support to the training and education needs of companies. A number of national workshops and panel discussions were organised, so that the project participants could discuss the findings of the case studies and the survey, exchange their practices and plan future actions. |
| Results/Relevant information for K4F project | The project generated a knowledge base and identified best practice examples on the anticipation of future restructuring and change management among companies of the main industry sectors in Slovenia, Czech Republic and Hungary. The main message that emerged |
during the project was that trust, communication, transparency and inclusion of workers’ representatives are essential for a successful management of change. This project is a good practice example of a tripartite partnership between employer organisations, trade unions and public employment services for the proactive management of restructuring and change. Recommendations produced during the project could be used by companies and public authorities in creating the environment that is favourable to quality management of change.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>REGIONAL INNOVATION POLE – A POLICY FOR CLUSTERING AND PRODUCT DEVELOPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>The South-East Europe Transnational Cooperation Programme</td>
</tr>
<tr>
<td>Country/Partners</td>
<td>Region of Central Macedonia&lt;br&gt;Aristotle University of Thessaloniki, Greece</td>
</tr>
<tr>
<td>Web site (if any)</td>
<td><a href="http://www.innovationpole.eu">www.innovationpole.eu</a></td>
</tr>
<tr>
<td>Aim/Objectives</td>
<td>The implementation of the strategic policy ‘Regional Innovation Pole in Central Macedonia (RIPCM)’ enabled the cooperation of a big number of enterprises, research organisations and innovation institutions in the formation of the regional innovation ecosystem. The implementation of a strategic policy in a specific sector (ICT) initiated the formation of a permanent mechanism for the support of innovation and innovation culture in the region.</td>
</tr>
<tr>
<td>Results/Relevant information for K4F project</td>
<td>To implement the ICT sector related cluster, RIPCM performed four types of instruments and actions:</td>
</tr>
<tr>
<td></td>
<td>• Regional technology platforms: They lead the cooperative approach regarding the selection and application of technologies. Organisations from industry and research, financial institutions, regulatory authorities, as well as users cooperate to identify both the vision and technologies. Three technological platforms were implemented: (1) Broadband networks and Internet services, (2) Digital systems and telecommunication systems, and (3) Software technologies and knowledge software.</td>
</tr>
<tr>
<td></td>
<td>• New product development: Consortia bring together ICT companies, end-user companies and technology providers from universities and research centres. Each consortium addresses the making of an innovative product or service. Following an open call and double assessment, 14 consortia were selected out of 70 proposals submitted (by taking into account: the strategic importance of the proposed technology application that the consortium intended to develop; the clear evidence of the usefulness and viability of the new product or service; the clear evidence of consortium partners regarding long-term commitment for cooperation; and the effort to place the new product or service on the market).</td>
</tr>
<tr>
<td></td>
<td>• Creation of spin-off companies and commercialisation of research results: Foundation of new high-tech enterprises is a challenge to entrepreneurial and empowerment strategies per se. Collaborative networking, esp. cooperation between R&amp;D labs and motivated people having the necessary skills to set and run a new business is crucial to</td>
</tr>
</tbody>
</table>
be successful. The creation of 5 spin-offs was supported through the RiPCM policy implementation.

- Horizontal activities: Awareness and support activities helped to create wider cooperation networks involving all actors related to ICTs. They offer a wide range of innovation support services (technology transfer, international cooperation, market promotion, etc.) to all organisations comprising the ICT innovation system.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>A FESTIVAL FOR TECHNOLOGY TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>The South-East Europe Transnational Cooperation Programme</td>
</tr>
<tr>
<td>Country/Partners</td>
<td>Regional Development Agency of Rodopi S.A. in collaboration with the Centre of Technological Research of Eastern Macedonia &amp; Thrace, Kavala Technological Institute and the Regional Authority of Eastern Macedonia &amp; Thrace, Greece</td>
</tr>
<tr>
<td>Web site (if any)</td>
<td><a href="http://www.i2fest.gr">www.i2fest.gr</a></td>
</tr>
<tr>
<td>Aim/Objectives</td>
<td>The Industrial Informatics Festival attempted to shed light on the potential of the industrial informatics industry as well as the crucial influence of innovative plans on the social, economic, and cultural life of the citizens. Its specialised action programme intended to stimulate the students of the local and regional area to bring into surface innovative good practices and to provide the opportunity to the students to present their work on each relevant theme.</td>
</tr>
<tr>
<td>Results/Relevant information for K4F project</td>
<td>Key factors of success were the voluntary organisational support of 120 local students and citizens, the involvement of academic institutions and their networks as well as the extensive coverage from mass media (internet, web TV) ensuring the diffusion and dissemination of the good innovative practices in the wider region. The high number of participants either as visitors or in a volunteering basis provided a strong sense of success concerning the event.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>Textile &amp; Clothing Business Labs (TCBL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>European Union's Horizon 2020 Programme for research, technology development, and innovation under grant Agreement n.646133</td>
</tr>
<tr>
<td>Country/Partners</td>
<td>CITY OF PRATO (LEAD PARTNER) German Institutes for Textile and Fiber Research - Center for Management Research (DITF) Istituto Superiore Mario Boella Skillaware The Open University iMinds Tavistock Institute</td>
</tr>
</tbody>
</table>
### Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

<table>
<thead>
<tr>
<th>Materials Industrial Research &amp; Technology Center S.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waag Society</td>
</tr>
<tr>
<td>Huddersfield &amp; District Textile Training Company Ltd</td>
</tr>
<tr>
<td>eZavod</td>
</tr>
<tr>
<td>Consorzio ARCA</td>
</tr>
<tr>
<td>UnionCamere del Veneto</td>
</tr>
<tr>
<td>Hellenic Clothing Industry Association</td>
</tr>
<tr>
<td>Sanjotec - Centro Empresarial e Tecnológico</td>
</tr>
<tr>
<td>Clear Communication Associates Ltd</td>
</tr>
</tbody>
</table>

**Web site (if any)**  
http://tcbl.eu/

**Aim/Objectives**  
It aims to transform the Textiles and Clothing industry, with the objective of bringing 5% of production capacity back to Europe by 2025. As the industry continues to experience a period of deep crisis, with a constant de-localisation driven by the search for low cost labour, new and significant opportunities are emerging based on new production and distribution technologies, innovative organisational models, and new creative energies. In parallel, customers are showing increasing attention to ethical and environmental sustainability in the clothes they wear. The gap, however, between possible new business models and the reality of small and micro-enterprises is too wide and the risk they face in experimenting new models is currently too high.

TCBL aims to bridge this gap with the creation of a network of Business Labs that freely experiment with the implications of potential innovations and their concrete impacts on business operations. Three types of laboratory focus on specific areas of the value chain:

- **Design Labs** explore tools and methods for designing textiles and clothes, working with professionals, fashion students, or anyone, even working from home.
- **Making Labs** experiment with production methods and machinery old and new, from re-discovering traditional tailoring to 3D printing and laser cutting.
- **Place Labs** investigate the local and social dimensions of clothes making, with new modes of organisation of work such as on-demand or home DIY production, community lab spaces, and networks of artisan shops.

**Results/Relevant information for K4F project**  
These laboratories interact with a substantial number of sector enterprises of various dimensions – “pilot businesses” – who compose innovation elements coming from different Business Labs to identify transition scenarios that can accompany their shift from current ways of working towards more innovative and competitive business models. This process is supported by interactive knowledge and learning services together with an open repertoire of business services supporting specific moments of the new business models: training, logistics, etc.

The interactive and creative processes in TCBL aim to gradually build an integrated business ecosystem covering the entire value chain. The initial configuration in project year 2 will consist...
of 15 Business Labs and 60 Pilot Businesses, while by the project’s end this will grow to 90 Labs, 240 Pilots, 35 service enterprises, and 15 start-ups. This exponential path of ecosystem growth will be sustained by yearly Calls for Expression of Interest in the TCBL Associates Programme, which will select new members to receive specific support and assistance from project partners.

TCBL is thus expected to have a widespread impact on the T&C industry in Europe, shifting consumer goals, expectations, and even engagement in the processes of designing and making clothes. This in turn will have both social and environmental impacts, as well as influencing attitudes towards responsible fashion and significantly improving the prosperity of Europe’s diffused system of production.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>Technology Enhanced Learning Living Lab for Manufacturing Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>European-funded research project to improve training in small and medium-sized manufacturing environments by using the latest technologies and insights.</td>
</tr>
</tbody>
</table>
| Country/Partners | TXT E-SOLUTIONS  
OPEN UNIVERSITY  
AGUSTAWESTLAND  
AIDIMA  
KTH – ROYAL INSTITUTE OF TECHNOLOGY  
ALFAMICRO  
DITF DENKENDORF  
PROFITEX TEXTILSERVICE  
ASSOCIATION FOR THE ADVANCEMENT OF RADICAL BEHAVIOR ANALYSIS  
SOFTECO SISMAT  
VTT TECHNICAL RESEARCH CENTRE OF FINLAND  
PIKSEL  
INTEROP-VLAB  
CLEAR COMMUNICATION ASSOCIATES |
| Web site (if any) | www.tellme-ip.eu |
| Aim/Objectives | TELL ME aims to develop and trial  
- an innovative cross-enterprise methodology and  
- IT platforms for  
  o continuous education and training in heterogeneous business ecosystems,  
  o blending Precision Teaching (PT)  
  o lifelong learning and  
  o participative co-creation aspects in Living Labs (LL) |
In authentic SME-driven human-centric and service-oriented manufacturing workplace contexts using ways to address more business needs than traditional training. The project’s approach responds to several EU 2020 Strategies in several Flagship Initiatives like “An Agenda for new skills and jobs”, "An industrial policy for the globalisation era", “Innovation Union” and “Digital Agenda for Europe” by answering the following questions:

- How can SMEs blue collar workers in less advanced industrial sectors keep the pace of innovation in technologically advanced ones?
- How can TEL-based training be positioned and improved, in order to have more impact on industrial sector’s innovation and resilience?

Five main challenges have been identified as fingerprints of the TELL ME proposal:

1. Human-centered manufacturing and the increasing need to consider human factors and workers wellbeing in the production processes;
2. Service oriented Manufacturing and its increasing need to open, breed and govern globalised business ecosystems;
3. Learning Ecosystems are the new frontier of collaborative value networks on a global and cross-sector market;
4. Living Labs of SMEs and their need to constantly develop business-technical-social-market innovation via co-creation and inspirational environments;
5. Learning at the Workplace and its need for fast, punctual and personalised life-long learning that takes account of fluency-driven approaches to training, and trends in using TEL and OER for self-regulated learning.

<table>
<thead>
<tr>
<th>Results/Relevant information for K4F project</th>
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</thead>
<tbody>
<tr>
<td>- New Learning methodology, encouraging co-creation and creativity with multimedia examples;</td>
</tr>
<tr>
<td>- Cross-organisational and human-centred ecosystem IT infrastructure interconnecting Real World (Internet of Things) learning workplaces with Digital World (Internet of Contents) learning results and Virtual World learning simulations to push back to the worker just the relevant, situational and context aware learning experiences;</td>
</tr>
<tr>
<td>- Multimedia Learning Distributed Repository: a source of knowledge with advanced search, summarisation, customisation facilities;</td>
</tr>
<tr>
<td>- Human-centric Industrial Workplaces: tools and methodologies including mobile and hands-free wearable interaction devices for blue collar workers;</td>
</tr>
<tr>
<td>- Business Innovation and Economic Impact Assessment: business models will define new participative methods to improve the impact of proposed solutions;</td>
</tr>
<tr>
<td>- Integrated systems and TELL ME Pilots learning systems: they will be tested in the three SME-driven pilots but other domains could benefit from it, like energy and environment.</td>
</tr>
<tr>
<td><strong>Title of the project/initiative</strong></td>
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<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Funding organisation or programme (if any)</strong></td>
</tr>
</tbody>
</table>
| **Country/Partners** | EURATEX The European Textile and Apparel Confederation, Europe  
BMS vision Belgium  
BAATPE Bulgarian Association of the Apparel and Textile Producers and Exporters, Bulgaria  
CITEVE Technological Centre for the Textile and Clothing Industry of Portugal, Portugal  
CEA Croatian Employers’ Association, Croatia  
DITF German Institutes for Textile and Fiber Research Denkendorf, Center for Management Research, Germany  
ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development, Italy  
Gherzi group Europe  
INCDTP National Research & Development Institute for Textiles and Leather, Romania  
LATIA (Lithuanian Apparel and Textile Industry Association, Lithuania)  
Pirin-TexEood Bulgaria |
| **Aim/Objectives** | The SESEC project is designed to address the energy efficiency needs of the EU clothing industry.  
The Consortium relies on outstanding competences of the partners, spread over 6 countries (Bulgaria, Romania, Portugal, Italy, Germany and Belgium) to provide the missing energy efficiency benchmarks and ready-to-use solutions for the large number of SMEs as well as larger companies.  
The SESEC project has 4 major objectives:  
- To develop, test and offer an Energy Efficiency tool for clothing production, made up of guidelines and web-based applications, suitable for SMEs and large companies  
- To transfer the project results to the sector, EURATEX members and interested companies  
- To offer training and support to companies to implement energy-saving measures considering cost-effectiveness  
- To improve opportunities for energy-efficiency for the whole European clothing industry |
| **Results/Relevant information for K4F project** | - Develop, test and offer an energy efficiency tool, tailored for garment manufacturing companies and especially the SMEs ones;  
- Offer training and support for companies to implement energy-saving measures considering cost-effectiveness;  
- In the longer term, to improve opportunities for energy efficiency for the whole European clothing industry. |
<table>
<thead>
<tr>
<th><strong>Title of the project/initiative</strong></th>
<th>Customer-oriented and eco-friendly networks for healthy fashionable goods</th>
</tr>
</thead>
</table>
| **Funding organisation or programme (if any)** | European Commission FoF.NMP.2010-2 Project 260 169  
Area: "Supply chain approaches for small series industrial production" |
| **Country/Partners** | TXT e-solutions SPA (Italy) Coordinator  
ITIA-CNR -Institute of Industrial Technologies and Automation -National Council of Research (Italy)  
INESC Porto - INstituto de Engenharia de Sistemas e Computadores do Porto (Portugal)  
Deutsche Institute fuerTextil- und FaserforschungDenkendorf (Germany)  
Strategies (France)  
MANAS SPA (Italy)  
DOUÊLOU NV (Belgium)  
PEPPERMINT HOLDING GMBH (Germany)  
ERGOSOFT AG (Switzerland)  
FRATELLI PIACENZA S.P.A. (Italy)  
Synesis (Italy)  
ASSYST GMBH (Germany)  
TOMORROW OPTIONS MICROELECTRONICS S.A. (Portugal)  
OfficinaOrtopedicaMichelotis.r.l. (Italy) |
| **Web site (if any)** | http://www.corenet-project.eu/ |
| **Aim/Objectives** | The objective of CoReNet is to address consumer needs and expectations of a wide range of European citizens as well as specific target groups - such as elderly, obese, disabled, or diabetic people - by supplying a small series of functional and fashionable clothes and footwear of high quality, affordable price and eco-compatibility.  
Therefore, the European Textile, Clothing and Footwear Industry will be enabled to provide customised health fashionable goods for relevant social niches, so improving its market shares.  
In order to design, to develop, to produce and to distribute the related small order quantities in a cost- and eco-efficient way, a new framework and components for new collaborative networking will be developed, enabling to stay as long as digital and to produce on-demand.  
This includes  
- consumer integrated collaborative eco-oriented design, and configuration of healthy wearables using web-enabled virtualisation and green materials;  
- a radical renewal of critical value creation steps by the adoption of Rapid Manufacturing technologies for optimised digital printing and laser engraving; and  
- the overall integration and co-ordination of business processes and information exchange by a set of new (web)services for network design and ad-hoc (re-)configuration, for real-time planning, forecasting and replenishment, and for tracking and tracing of ecology and quality. |
Within CoReNet framework, all partners of the value creating sectors will become able to co-ordinate value creation processes, with the end consumer as driving actor. CoReNet will be collaboratively tested and demonstrated within industrial plants, thus showing the full potential of the new sustainable collaborative cross-sector networking approach.

**Results/Relevant information for K4F project**

**Reference Framework for Collaborative Supply Networks**

The reference framework will address, orientate and integrate all aspects both at organisational and technological level concerning interaction of organisations and business processes in two concurrent sectors, considering co-ordination and synchronisation of contents, as well as information exchange and software application modularity, in order to create a seamless flow of information from market to design and development, to production and distribution.

**Innovative consumer-driven environments for product design**

This result will address the implementation of innovative environments for collaboration and knowledge management during design phase. The goal is to create a novel concept that enables the vision of an “empowered-to-design” consumer from one side, and the creation of market and design knowledge from the history of consumer-to-designer, consumer-to-consumer and designer-to-designer interactions within a social network environment.

**Methods and tools for supply network configuration and distributed production planning including consumer-oriented Collaborative Planning**

Innovative and adaptive services for production process modelling and supply networks formation and management will be based on a distributed interaction system to integrate different actors (components suppliers, outsourcers, service providers, retailers, customers) of different sectors collaborating in dynamic networks. Product quality control based on environmental impact parameters will be developed through a shared platform for eco-monitoring.

Small series and personalised products will require totally different supply networks structures, where each company should be able to produce the complete product (all or most of the operations) and will be specialised by the type of product or market segment. In this context, a supply network will have to be configured for each customer order and tend to include a small number of companies. The key selection criteria will be the ability to perform the required operations for the desired delivery date, with the expected cost.

**Rapid manufacturing technologies for small series industrial production**

This result will enable the flexible, energy and eco-efficient production of specific added value components/parts of consumer personalised goods through rapid manufacturing multi-purpose machines. In particular, reduction of set-up time is crucial in the production of small series in order to avoid loss of time when changing models. Two particular phases of production process (printing and engraving) will be taken into consideration because they represent critical steps for the personalisation of fabric and leather in the definition of the new collections. These results will be all integrated in real demonstration environments. Integrated demonstrator can be considered a result in terms of functioning pilot collaborative supply
network offering integrated small series of clothing and shoes to target groups. The pilot demonstrator will be composed of manufacturing companies collaborating with technologies providers along product lifecycle where coordination has to be managed at supply network and not at company level.

**Title of the project/initiative** | CLEVERTEX
---|---
**Funding organisation or programme (if any)** | EUROPEAN COMMISSION UNDER 6TH FRAMEWORK PROGRAMME
**Country/Partners** | INSTITUT FRANÇAIS DU TEXTILE ET DE L'HABILLEMENT
**Web site (if any)** | http://109.2.243.201/#features
**Aim/Objectives** | CleverTex aims at developing a master plan and a framework for future actions in research, education and technology transfer in the fields of multi-functional intelligent textile materials in Europe for transforming the industry into a dynamic, innovative, knowledge-driven, competitive and sustainable sector by 2015. CleverTex project aims to contribute to the economic and social progress in the European Union by transforming the industry into a dynamic, innovative, knowledge-driven, competitive and sustainable sector by 2015. To that a master plan and framework for future actions in research, education and technology transfer in the field of multi-functional intelligent textile materials in Europe will be developed.
**Results/Relevant information for K4F project** | • state of the art  
• socio economic study  
• scenarios  
• gap analysis

---

**Title of the project/initiative** | ATC21S – Assessment and Teaching of 21st Century Skills
---|---
**Funding organisation or programme (if any)** | Microsoft, Cisco and Intel
**Country/Partners** | University of Melbourne, Microsoft, Cisco and Intel
**Web site (if any)** | http://www.atc21s.org/
**Aim/Objectives** | **Empowering Students to Succeed**  
The Challenge: Transform Education for the 21st Century  
Today’s curricula do not fully prepare students to live and work in an information-age society. As a result, employers today are often challenged with entry-level workers who lack the practical skills it takes to create, build and help sustain an information-rich business. Although reading, writing, mathematics and science are cornerstones of today’s education, curricula must go further to include skills such as collaboration and digital literacy that will prepare students for 21st-century employment. Establishing new forms of assessment can begin a fundamental change in how we approach education worldwide.
The Foundation: Assessment
To make changes at the classroom level, policy-makers need accurate information about the skills of the student population. Gathering that data through assessment is a critical component. ATC21S has developed methods to assess skills that will form the basis for 21st-century curricula, with an emphasis on communication and collaboration, problem-solving, ICT literacy.

Into the Classroom
ATC21S offers 21st-century curricula recommendations for education systems to support an improved workforce. We have introduced innovative assessments along with teaching and learning resources to help students develop 21st-century skills. Translating these skills to the classroom will shape the economic and social development of countries and communities for years to come.

<table>
<thead>
<tr>
<th>Results/Relevant information for K4F project</th>
<th>Five white papers defining the skills of the 21st century, peer-reviewed and published in leading journals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assessment tools created for two core skill sets: collaborative problem-solving and ICT literacy.</td>
</tr>
<tr>
<td></td>
<td>Six countries (Australia, Costa Rica, Finland, the Netherlands, Singapore, and the United States) piloted the assessment skills in cognitive labs on 5000 students. Fieldwork trials are continuing.</td>
</tr>
<tr>
<td></td>
<td>Results presented at the 2012 Education World Forum in London</td>
</tr>
<tr>
<td></td>
<td>Singapore developing strategy to deploy the assessment tools broadly</td>
</tr>
</tbody>
</table>

### INGA-3D - Creative transfer of competence in 3D footwear CAD to VET professionals

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>INGA-3D - Creative transfer of competence in 3D footwear CAD to VET professionals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>Lifelong Learning Programme - Leonardo da Vinci – Transfer of Innovation</td>
</tr>
<tr>
<td>Country/Partners</td>
<td>1. Faculty of Textiles, Leather and Industrial Management from “Gheorghe Asachi” Technical University of Iași, Romania; 2. Instituto Tecnológico del Calzado y Conexas (INESCOP), Spain; 3. Virtual Campus, Lda., Portugal; 4. University of Salford, United Kingdom; 5. Istituto Europeo di Design, Spain; 6. Red 21, S.L., Spain</td>
</tr>
<tr>
<td>Web site (if any)</td>
<td><a href="http://www.inga3d.eu">http://www.inga3d.eu</a></td>
</tr>
<tr>
<td>Aim/Objectives</td>
<td>To transfer and extend innovative software solutions and 3D technologies for computer-aided footwear design</td>
</tr>
<tr>
<td>Results/Relevant information for K4F project</td>
<td>INGA 3D training programme based on learning outcomes and articulated to ECVET system</td>
</tr>
<tr>
<td></td>
<td>3D Footwear Computer Aided Design – Handbook designed in an effective educational approach to modules and units of learning outcomes.</td>
</tr>
</tbody>
</table>
3D Footwear Computer Aided Design - Multimedia supportive guide for VET teachers, trainers and tutors

INGA 3D Online Learning Platform

Piloting training sessions based on blended learning in Spain, Romania and UK involving 65 participants.

Exploitation workshop: The INGA 3D project’s achievements were presented by coordinator in a plenary lecture and all partners sustained it through dissemination materials, demonstrations and discussions during practical workshops. Totally, 150 participants attended the event. The conference had an excellent attendance rate of foreign participants and speakers that came from 6 EU-Med countries.

**Title of the project/initiative**

TIED SHOE - Training in Innovation, Entrepreneurship and Design for the Footwear Industry

**Funding organisation or programme (if any)**

Lifelong Learning Programme - Leonardo da Vinci – Transfer of Innovation

**Country/Partners**


**Web site (if any)**

http://www.tied-shoe.eu/

**Aim/Objectives**

Starting from a previous project – VTC-SHOE – focused on footwear design, TIED SHOE aims at:

- Extending the innovation in training to different European countries, like Portugal, Spain, Romania, Greece and Croatia.
- Incorporating modules that address the need for Innovation and Internationalisation.
- Expanding the concept of Virtual Training into a Community of Practice to share experiences and present a common approach to non-European competition.
- Promoting the integration of ECVET as a qualification framework to ensure common recognition of qualifications across Europe.

**Results/Relevant information for K4F project**

- Creation of a collaborative platform (Virtual Community of Practice for the Footwear Industry Professionals) for professionals, trainers and teachers, trainees and students, entrepreneurs, strategy and decision makers, companies, other stakeholders... in the footwear, leather, and related industries, who wish to deepen their knowledge, share opinions, look for resources or the latest news.
### SHOE FUTURE - Education of new generation of leather and footwear expert profiles

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>Lifelong Learning Programme - Leonardo da Vinci – Multilateral Projects on Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>1. ZAVOD IRCUO – Industrijsko razvojni center usnjarske in obutvene industrije, Slovenia; 2. Ars Arpel Group, srl, Italy; 3. Universita Tomàše Bati ve Zlíne, Fakulta technologicka, Czech Republic; 4. International Shoe Competence Center Pirmasens GmbH, Germany; 5. Centro Tecnológico do Calçado de Portugal, Portugal.</td>
</tr>
<tr>
<td>Web site (if any)</td>
<td><a href="http://www.shoe-learn.com">http://www.shoe-learn.com</a></td>
</tr>
<tr>
<td>Aim/Objectives</td>
<td>To educate experts that will contribute to the future success of footwear companies. Therefore, the project focused on educating on added value areas of knowledge and expertise: (1) footwear technologist, (2) shoe and haberdashery designer, (3) last developer, (4) soles developer, (5) CAD expert for shoe and haberdashery computer modelling, (6) quality manager.</td>
</tr>
<tr>
<td>Results/Relevant information for K4F project</td>
<td>Training of at least 15 young (age between 20 and 45 years) experts per profile, which means 90 new educated profiles, able to take over or improve the efficiency of their added value positions in the companies.</td>
</tr>
</tbody>
</table>

### E-SHOE LEARNING - Training innovation in the footwear sector

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>Leonardo da Vinci 1. Pilot Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>1. ZAVOD IRCUO – Industrijsko razvojni center usnjarske in obutvene industrije, Slovenia; 2. Association of leather and footwear industry of Czech Republik, Czech Republic; 3. Portuguese Leather Technology Centre (CTIC-PT), Portugal; 4. Association of leather and footwear industry of Slovak Republik, Slovakia; 5. Izobraževalni center Cene Štupar, Slovenia.</td>
</tr>
<tr>
<td>Country/Partners</td>
<td>1. ZAVOD IRCUO – Industrijsko razvojni center usnjarske in obutvene industrije, Slovenia; 2. Association of leather and footwear industry of Czech Republik, Czech Republic; 3. Portuguese Leather Technology Centre (CTIC-PT), Portugal; 4. Association of leather and footwear industry of Slovak Republik, Slovakia; 5. Izobraževalni center Cene Štupar, Slovenia.</td>
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<tr>
<td>Web site (if any)</td>
<td><a href="http://www.shoe-learn.com">http://www.shoe-learn.com</a></td>
</tr>
<tr>
<td>Aim/Objectives</td>
<td>The project contributes to the development and sharing of knowledge related to footwear development and manufacturing. There is no secondary or tertiary footwear education level in Slovenia, but there are still quite many small, medium and big sized companies, which need educated workers to produce and sell quality products.</td>
</tr>
<tr>
<td>Results/Relevant information for K4F project</td>
<td>Companies from the leather and footwear industry were very interested in the results of this project. Educated employees represent the core of their competitive strategies. That is why companies (their high-level experts) were included as external quality control into the project. By including them into project quality management they had the possibility to customise project results to their needs and were consequently interested in attracting their personnel for usage of results.</td>
</tr>
</tbody>
</table>
## Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>SHOE FUTURE - Education of new generation of leather and footwear expert profiles</th>
</tr>
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<tbody>
<tr>
<td><strong>Funding organisation or programme (if any)</strong></td>
<td>Lifelong Learning Programme - Leonardo da Vinci – Multilateral Projects on Innovation</td>
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<td><strong>Country/Partners</strong></td>
<td>1. ZAVOD IRCUO – Industrijsko razvojni center usnjarske in obutvene industrije, Slovenia; 2. Ars Arpel Group, srl, Italy; 3. Universita Tomàše Bati ve Zline, Fakulta technologicka, Czech Republic; 4. International Shoe Competence Center Pirmasens GmbH, Germany; 5. Centro Tecnológico do Calçado de Portugal, Portugal.</td>
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<td><strong>Results/Relevant information for K4F project</strong></td>
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</tbody>
</table>

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<thead>
<tr>
<th>Title of the project/initiative</th>
<th>STEP TO SUSTAINABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or programme (if any)</strong></td>
<td>Lifelong Learning Programme - Leonardo da Vinci – Multilateral Projects on Innovation – Development of Innovation</td>
</tr>
<tr>
<td><strong>Country/Partners</strong></td>
<td>CTCP, CEC, INESCOP, TUIASI, ISC GERMANY, ARS SUTORIA, KLAVENESS, ZAVOD IRCUO, COKA</td>
</tr>
<tr>
<td><strong>Web site (if any)</strong></td>
<td><a href="http://www.step2sustainability.eu">http://www.step2sustainability.eu</a></td>
</tr>
<tr>
<td><strong>Aim/Objectives</strong></td>
<td>The main objective of the project STEP to SUSTAINABILITY is to design, develop and pilot a new job qualification profile and correspondent training on the subject of &quot;Footwear Sustainable Manufacturing&quot; able to cope with the visible shortage of vocational skills, potentiating the best use of the outcomes in the field of materials, machinery, processes, developed in the frame of many European Research &amp; Development Projects with sustainable purposes, improving competitiveness in Footwear.</td>
</tr>
</tbody>
</table>
| **Results/Relevant information for K4F project** | - To develop a deep knowledge on occupation and training needs to implement sustainable manufacturing in Footwear and possible already existing learning opportunities;  
- To develop a new occupation/qualification profile of the expert in sustainability, capable of dealing with all the frameworks around sustainability;  
- To develop a learning programme able to cope with the identified training needs, according to European Common Framework on Vocation, Educational Training (ECVET);  
- To develop innovative training units; |
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015-1-RO01-KA203-015198

- To development the b-learning course, including e-learning component and work based learning workshops;
- To pilot the results;
- To create awareness for the need of a sustainable manufacturing strategy;
- To exploit results through European, national and local networks and platforms, enterprises, business organisations, guidance organisations, as well as other relevant media, inside and outside Europe.
- To increase the networking between the partners.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>BMW – BE A MENTOR IN THE WORKPLACE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or programme (if any)</strong></td>
<td>Lifelong Learning Programme - Leonardo da Vinci – Multilateral Projects on Innovation – Transfer of Innovation</td>
</tr>
<tr>
<td><strong>Country/Partners</strong></td>
<td>CTCP, JONAC (University of Leuven – Belgium), OBELISK (Belgium), PROFUTURA (Poland – IT partner), POINT (TR), COOP (SK) AND INOVA CONSULTANTS (UK)</td>
</tr>
<tr>
<td><strong>Web site (if any)</strong></td>
<td><a href="http://www.bmw-eu.net">http://www.bmw-eu.net</a></td>
</tr>
<tr>
<td><strong>Aim/Objectives</strong></td>
<td>The project aims at developing tools on the innovative approach in the field of Mentoring, promoting the inter relation between different generation, bringing profits for the people/youngsters and seniors’ employability and SMEs competitiveness.</td>
</tr>
</tbody>
</table>
| **Results/Relevant information for K4F project** | - to develop knowledge on mentoring culture, opportunities and practices, and installed capacity for Mentoring practices in SME;  
- to provide SMEs with an ICT based framework for setting up Mentoring, allowing them to implement mentoring indoor;  
- to develop and disseminate a methodology for certifying Mentors, common to all countries involved in the consortium, with potential to be disseminated to all Europe, including an innovative course for mentors according to ECVET, making the linkage between SMEs and VET and potentiating Mentoring as an innovative practice in the field of VET, to be mainstreamed within E&T System;  
- to provide mentees with an innovative guide to orient them in an effective mentoring relationship in the workplace;  
- to provide an ICT based training for becoming Mentor and e-Mentor including a feedback system to evaluate the mentoring system/results and the mentoring relationship strengthening the relationship raised between mentor and mentee;  
- to outstanding workplace learning, providing different learning activities for older and younger people (networking, ICT based learning), potentiating and disseminate a learning practice within E&T system, which makes it closer to world of work, anticipating needs, learning opportunities, supporting the transfer of skills in danger of being lost (in traditional sectors) and provide a better support to the employability of different target-groups: older, motivating them to continue work and learn; younger, offering work based learning opportunities and a career support;  
- attention to demographic changes and higher vulnerability of women in working life, |
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

as well as discrimination of older people at work, promoting a culture that stimulates learning and continue improving and good organisational climate, increasing employability, job satisfaction, passion and work engagement, “talent” management.

- The project is an example of promotion LLL work-based activities, through the mentoring model simultaneously with solutions to face demographic changes.

<table>
<thead>
<tr>
<th>Title of the project/initiative</th>
<th>DUALTRAIN - BUINDING A SUSTAINABLE APPROACH TO DUAL TRAIN MODEL IN EDUCATION AND TRAINING IN PORTUGAL, SPAIN AND GERMANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or programme (if any)</td>
<td>ERASMUS+ KA2 – STRATEGIC PARTNERSHIPS</td>
</tr>
<tr>
<td>Country/Partners</td>
<td>Parceiros do Projecto</td>
</tr>
<tr>
<td></td>
<td>- UNIVERSIDADE DO MINHO</td>
</tr>
<tr>
<td></td>
<td>- CTCP</td>
</tr>
<tr>
<td></td>
<td>- INESCOP- INST. ESPAÑOL DE CALZADO Y CONEXAS</td>
</tr>
<tr>
<td></td>
<td>- Edit Value</td>
</tr>
<tr>
<td></td>
<td>- Universitaet Bremen</td>
</tr>
<tr>
<td></td>
<td>- ISC Germany</td>
</tr>
<tr>
<td>Web site (if any)</td>
<td><a href="http://www.dualtrain.eu/">http://www.dualtrain.eu/</a></td>
</tr>
<tr>
<td>Aim/Objectives</td>
<td>The project aims at understanding how Dual Train work in Germany and to adapt it to the situation and reality in Portugal and Spain. The Dual train consists in an alternative envisaging higher level of success in providing better qualifications and employability to young people</td>
</tr>
<tr>
<td>Results/Relevant information for K4F project</td>
<td>• Comparative study on VET systems in PT, SP and DE.</td>
</tr>
<tr>
<td></td>
<td>• Training paths</td>
</tr>
<tr>
<td></td>
<td>• Piloting implementation</td>
</tr>
<tr>
<td></td>
<td>• Methodology.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Title of the project</th>
<th>SHOES MADE IN EU - European Industrial Shoe Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding organisation or program</td>
<td>Erasmus+ Programme of the European Union</td>
</tr>
<tr>
<td>Country/ Partners</td>
<td>• Polish Chamber of Shoe and Leather Industry (PIPS) – Poland</td>
</tr>
<tr>
<td></td>
<td>• Leather Industry Institute (IPS) – Poland</td>
</tr>
<tr>
<td></td>
<td>• Lodzkie Region – Poland</td>
</tr>
<tr>
<td></td>
<td>• International Shoe Competence Center – Germany</td>
</tr>
<tr>
<td></td>
<td>• Centro Tecnológico do Calçado de Portugal CTCP – Portugal</td>
</tr>
<tr>
<td></td>
<td>• The European Confederation of the Footwear Industry (CEC) – Belgium</td>
</tr>
<tr>
<td></td>
<td>• CCS Digital Education (CRYSTAL CLEAR SOFT) – Greece</td>
</tr>
</tbody>
</table>
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

Project 2015-1-RO01-KA203-015198

Objectives

- Strengthen the quality of vocational training in the footwear sector in order to reinforce the competitive edge of European footwear manufacturers;
- Improve and promote vocational and educational training in the footwear sector in Poland and other European countries;
- Create a harmonised EU industrial shoemaker training programme to facilitate mobility of workers between European countries;
- Match young industrial shoemakers’ skills with labour market needs.

Website

http://shoesmadeineu.eu/

Results/Relevant information for K4F project

The aim of the project is to develop a new curriculum for «Industrial Shoemakers» focusing on the engineering and manufacturing process. The idea is to use the best practices of EU countries with a long-standing training tradition in the footwear sector and a flourishing footwear industry. The project partners work towards achieving the following:

- Define the new curriculum by sharing and enhancing the experiences of Poland, Germany and Portugal;
- Introduce training contents that meet the labour market needs and that encompass the most modern technological tools available;
- Define a training model recognised at EU level which complies with ECVET standards and includes work based learning practices;
- Facilitate the employability of young people enrolled in footwear training courses.

Title of the project

DUAL TRAIN- BUILDING A SUSTAINABLE APPROACH TO THE DUAL VOCATIONAL TRAINING SYSTEM IN PORTUGAL, SPAIN AND GERMANY

Funding organisation or program

Erasmus+ Programme of the European Union

Country/ Partners

- UNIVERSIDADE DO MINHO
- EDIT VALUE
- UNIVERSITAET BREMEN
- CTCP
- INESCOP
- ISC GERMANY

Objectives

- Study and understanding of the Vocational Educational systems of Germany, Spain and Portugal in order to transfer the best practices from the German Dual System to the Portuguese and Spanish systems.
- Development of a Training Path related to the shoe sector as the basis for the future pilot implementation.
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

- Implementation of country pilots in order to test the German model in a Portuguese and Spanish company. For the piloting, training materials, guide books and other didactic material will be provided, with special attention to the inclusion of both a theoretical and practical approach.

**Website**  
http://dualtrain.eu/#/

**Results/Relevant information for K4F project**

- The Pilot Approach, which will engage VET providers and SMEs, will take place in an SME selected by the research centres from the three countries. Trainees will practice for one month on the SME’s premises and will be supervised by a tutor. The selected VET provider will develop the pilot training according to the contents developed in the project.
- The pilot implementation will be monitored by the partners during the theoretical classes but also in the company. Teachers and companies’ tutors will be asked to provide their feedback on the results accomplished. Finally, to evaluate the Pilot Approach, stakeholders will be invited and asked to appraise in the field the trainees’ operations and evaluate for themselves the results accomplished.
- In this manner we will check if the system works and eventually take some measures to better fit trainees and SMEs needs.

<table>
<thead>
<tr>
<th><strong>Title of the project</strong></th>
<th>Advan2Tex - E-learning course for innovative textile fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding organisation or program</strong></td>
<td>Erasmus+ Programme of the European Union</td>
</tr>
</tbody>
</table>
| **Country/ Partners** | INCDDP – The National R&D Institute for Textiles and Leather – Bucharest, Romania  
University of Minho, Department of Textile Engineering – Minho, Portugal  
Textile Testing Institute – Brno, Czech Rep.  
University of Maribor, Department of Textile Materials and Design – Maribor, Slovenia  
Technical University “Gheorghe Asachi” Iasi, Romania |
| **Objectives** | enhancing the quality and relevance of the learning offer in training by developing an innovative textile course and e-learning platform and supporting the dissemination of the project’s outcomes;  
- improving the level and the assessment of textile competences, including entrepreneurship, languages and digital skills;  
- promoting take-up of innovative practices by use of Information and Communication Technologies (ICT), open and flexible learning.  
- promoting structured inter-regional cooperation  
- improving the capacities of organisations in the fields of training of specific textile target group  
- promoting entrepreneurship education, employability and new business creation, supporting the personal and professional development of the target group |
## Results/Relevant information for K4F project

The e-learning contains 7 modules related to innovative textile fields:

- Advanced knitting technology
- Virtual prototyping of garments, 3D scanning, clothing for people with special needs
- New methods for testing textile materials
- Standardisation of textile testing
- Sustainability of textile technologies
- Entrepreneurship
- Innovation management

## Title of the project

TECLO - Textile and Clothing Knowledge Alliance. Future textile and clothing managers for export, marketing, innovation, sustainability and entrepreneurship oriented companies

## Funding organisation or program

Erasmus+ Programme of the European Union

## Country/ Partners

- Link Campus University
- Universiteit Gent
- MCX – Material ConneXion Italia
- AEI – Agrupació d’Empreses Innovadores Tèxtils
- Universitat Politecnica de Catalunya
- Technological Educational Institute of Piraeus
- A Fotopoulou Glp
- Cre.Thi.Dev. – Creative Thinking Development
- Gheorghe Asachi Technical University of Iasi
- ASITEX – Asociatia Absolventilor Facultatii de Textile-Pielarie din Iasi
- University of Ljubljana
- Fundacja Rozwoju Przedsiębiorczości
- CIAPE – Centro Italiano per l’Apprendimento Permanente
- Guimel

## Objectives

- the development of sectorial methods for anticipation of skills needs;
- the set-up of the EU curricula of the new professional profile of the Textiles and Clothing Managers (TECLOM), endowed with more advanced social, entrepreneurial and management skills;
- the development and pilot of a MOOC for the new TECLOM.

## Website

http://teclo.eu/
Annex 4

Model of Questionnaire

4.1. Questionnaire applied to companies

4.2. Questionnaire applied to universities and research centres
Annex 4.1

Questionnaire applied to companies

Knowledge Platform for Transferring Research and Innovation in Footwear Manufacturing

Project 2015-1-RO01-KA203-015198

Questionnaire

on installed capacity to perform Research, Development and Innovation in Footwear Manufacturing

This questionnaire is organized into three sections. The first one has 10 questions where the respondent characterizes the company. In the second section, which contains 6 questions, they characterize their collaboration with Universities and Research Centres. The last section has 7 questions and aims to emphasize the role of education and research and to provide a deep understanding of the training needs for innovation and technological transfer.
INTRODUCTION

This questionnaire is developed within the framework of the “K4F-Knowledge Platform for Transferring Research and Innovation in Footwear Manufacturing” project, funded by the ERASMUS+ Programme, KA2 - Cooperation for Innovation and the Exchange of Good Practices Strategic Partnerships for Higher Education.

The project is addressed to European companies manufacturing footwear and footwear components. With the K4F project, the partners wish to facilitate the uptake of innovation and current and emerging technologies in order to increase their competitiveness and growth.

The first project activity has been to develop the present survey, which aims to identify the MIX of transversal and professional skills that can boost the transfer of novelties coming from research and innovation into product, processes and services in order to better understand the companies’ needs.

The results of the survey will be included in the study titled “Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing”.

Your contribution in completing the survey would contribute to the success of the initiative by providing a deep overview of the labour market needs for highly qualified professionals to uptake innovation and latest technologies into the company strategy.
Questionnaire applied to footwear companies

Section A- Background information

1. Company name:

2. Country:

3. Phone number:

4. E-mail:

5. Please provide some information about yourself

a) Your position in the Company:

☐ Owner/ CEO
☐ Head of RDI (Research, Development and Innovation)
☐ Head of Product Development
☐ Head of Manufacturing
☐ Other (please specify) _____________________

b) Your highest qualification

☐ Secondary
☐ Bachelor
☐ Master (MBA)
☐ PhD.
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

☐ Other (please specify) ____________

c) Gender

☐ M ☐ F

d) Age

☐ under 25
☐ 25-39
☐ 40-59
☐ 60+

6. How many employees does your company have?

☐ < 10 employees
☐ 11 to 50 employees
☐ 51 to 100 employees
☐ 101 to 250 employees
☐ > 250 employees

7. What type of PRODUCTS does your company produce? (multiple answers possible)

☐ Footwear
☐ Footwear components → If only footwear components, please go to question 9

8. What type of FOOTWEAR does your company produce? (multiple answers possible)

In terms of target-group:

1. Ladies’ shoes
2. Men’s shoes
3. Children’s shoes

In terms of type of shoes:
1. High fashion shoes
2. Casual shoes
3. Sports shoes
4. Occupational and safety
5. Outdoor and hiking shoes
6. Orthopaedics
7. Therapeutic or prophylactic shoes
8. Other, specify: ……………………………………………………….

9. Does your Company export some of its products?

☐ No
☐ Less than 25% of sales
☐ 25% to 49% of sales
☐ 50% to 75% of sales
☐ More than 75%

10. Does your Company have a Research, Development and Innovation (RDI) department?

☐ Yes $\Rightarrow$ If “YES” go to section B
☐ No
11. Does your company have specific people with responsibilities in Research, Development and Innovation, among their daily responsibilities as managers, designers or engineers/technicians?

☐ Yes
☐ No

Section B – Collaboration between the Industry and Universities/Research Centres

1. Did your Company cooperate with Universities and/or Research Centres in the last five years?

☐ Yes
☐ No

2. If “YES”, please indicate what type of cooperation you have developed (multiple answers possible)

☐ Forecast of skills requirements for the labour market
☐ Design of training programmes and curriculum development
☐ Recognition and validation of skills and competences
☐ Host of student-interns
☐ Placement of graduates
☐ Supporting students’ graduation thesis
☐ Sharing and transferring knowledge from/to company
☐ Partnership in Research & Development projects
☐ Participation in joint events and/or networks/clusters/meetings
☐ Development of innovative companies, including spin-offs and start-up companies
3. If “NO”, please provide the reasons that discourage you from cooperating with a University/Research Centre

☐ Other (please specify) ________________________

4. Which could be the benefits of cooperation between your Company and a University/Research Centre? (multiple answers possible)

☐ Higher prestige
☐ Competitiveness rise
☐ Increase added value of products
☐ Better management
☐ Access to research results
☐ Other (please specify) ________________________
☐ Do not know

5. This project will set up a Knowledge Platform for footwear manufacturing that facilitates the collaboration towards innovation and technological transfer among universities, companies and research centres. Is your company interested in becoming part of this Knowledge Community?

☐ Yes
☐ No
6. If you choose YES, please indicate your interests among the following areas (multiple answers possible):

☐ Enrolment of my staff in the Online training courses on footwear innovation and technological transfer

☐ Supporting placements of High Education (HE) students

☐ Evaluation and validation of the platform content (e.g. training needs, training curriculum and content for virtual internships)

☐ Participation at events organised by Knowledge4Footwear platform (e.g. brokerage sessions for identifying project ideas)

☐ Other (please specify) ______________________

7. If you choose NO, please indicate your reason (multiple answers possible):

☐ No resources (e.g. lack of human resources, lack of time, lack of money)

☐ Not a priority in our current company’s strategy

☐ Other (please specify) ______________________

Section C - Role of education and research in fostering innovation

Definition 1: “An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” (Source: OECD, Oslo Manual. Guidelines for collecting and interpreting innovation data, p.46, available at http://ec.europa.eu/eurostat/documents/3859598/5889925/OSLO-EN.PDF)

1. How would you appreciate your company according with the following levels of innovation?

☐ Level 1 – minimal changes to existing products, with low investment and risk

☐ Level 2 - new features integrated into the existing products, with medium investment and risk

☐ Level 3 - new products, with large investment and medium risk
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

PROJECT 2015-1-RO01-KA203-015198

☐ Level 4 – new products that are revolutionary (for example, products that change how people live), with large investment and big risk

2. Which of the following statements most accurately describes your company’s strategy in terms of Research, Development and Innovation activities? (multiple answers possible)

☐ My company is aware about the latest knowledge towards innovation in footwear manufacturing. We use in-house know-how and skills through our design, engineering, and/or marketing own departments. Also, the skills of the staff engaged in development and innovation activities are developed through internal training.

☐ My company is engaged in applied research in terms of: a) new materials and components for footwear; b) design and product development; c) advanced technologies; and d) sustainable manufacturing processes.

☐ My company develops new footwear product concepts, a stage which usually involves: a) design and prototyping; b) development and testing; and c) further research to modify designs and d) to improve the product’s characteristics.

☐ My company identifies the opportunities for commercialisation resulting from its own strategic research and applies new marketing methods and business models to become more competitive.

☐ My company performs various research and development work to adapt and modify the technical information toward innovative materials, product and/or process to its own needs.

☐ None of the above situations

3. In case you have selected NONE of the above statements, please justify your rationale. Which other situations could describe better your company’s strategy in terms of Research, Development and Innovation activities?

☐ Yes

4. Do you consider that your staff needs advanced training for performing Research, Development and Innovation activities?
5. Do the current study programmes of the universities stimulate creative thinking and problem solving approach among their students/graduates?

□ Yes
□ No

6. Please indicate what actions should be taken by the education and training providers to encourage students to deal with the footwear industry requirements for innovation. (multiple answers possible)

□ to take the students out of the classroom and to give them the necessary support to apply their knowledge to real work environment in a multidisciplinary way, including research, design and development, manufacturing, marketing and management

□ to apply a coherent programme for stimulating creative thinking, which may include: a) to encourage students to come up with innovative ideas about new products, concepts, processes and/or technological changes; b) to give students the opportunity to turn up the new ideas into real products; c) to provide necessary resources (capital) for prototyping and testing; and d) to reward the successful ideas of the students

□ to enrich the study/training programmes with modules with a focus on “key” issues of innovation for footwear industry, such as: CAD, rapid prototyping, andre-engineering, 3D printing, eco-design, advanced and flexible manufacturing, sustainability, customised and specialised production, new organisational methods, etc.

□ other (please specify) ________________________

7. K4F project will develop a training programme focused on research, development and innovation for the footwear sector. Please evaluate the importance of the following knowledge/skill in relation with the future training programme (multiple answers possible).

<table>
<thead>
<tr>
<th>Knowledge/Skill</th>
<th>NOT important</th>
<th>Of some importance</th>
<th>Important</th>
<th>Very important</th>
<th>Extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td>to demonstrate broad knowledge on the footwear products' processes and related technology/machinery, including all</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

**PROJECT 2015-1-RO01-KA203-015198**

<table>
<thead>
<tr>
<th>Phases of footwear manufacturing and different types of construction, design techniques raw materials and components</th>
</tr>
</thead>
<tbody>
<tr>
<td>to elaborate and to apply the procedures and tools for a Research and Development Management System, including new product development, technology development, process development, technological transfer</td>
</tr>
<tr>
<td>to carry out projects in relation to the latest developments on new materials and components for footwear</td>
</tr>
<tr>
<td>to develop new footwear concepts and products based on specific requirements of various customers and market trends</td>
</tr>
<tr>
<td>to carry out projects in relation to the latest developments on new manufacturing technologies and business models</td>
</tr>
<tr>
<td>to comply with the available legislation, regulations, certifications and standards regarding products and manufacturing processes</td>
</tr>
<tr>
<td>to demonstrate soft skill adapted to complex projects and working situations, such as: creative and critically thinking, solving problems, team working, entrepreneurial thinking</td>
</tr>
</tbody>
</table>

Please state other comments/observations/proposals

Thank you for your time and support in completing this questionnaire.
Annex 4.2

Questionnaire applied to universities and research centres

Knowledge Platform for Transferring Research and Innovation in Footwear Manufacturing

Questionnaire
On skills for Research, Development and Innovation in Footwear Manufacturing
Questionnaire applied to Universities and Research centres

Section A - Background information

1. Name of the Organisation (University/Research Centre):

2. Country:

3. Phone number:

4. E-mail:

5. Please provide some information about yourself

a) Your position in the Organisation:

   - Head of University (Rector/Vice-rector)
   - Head of Research Centre
   - Head of Faculty/Department (*please specify*)
   - Academic Staff (assistant, lecturer, associate professor, professor)
   - Researcher

b) Your highest qualification

   - Bachelor
   - Master (MBA)
   - PhD.
Section B – Collaboration between the Industry and Universities/ Research Centres

1. Did your University/Research Centre cooperate with footwear companies in the last five years?
   - Yes
   - No

2. If “YES”, please indicate what type of cooperation you have developed *(multiple answers possible)*
   - Forecast of skills requirements for the labour market
   - Design of training programmes and curriculum development
   - Recognition and validation of skills and competences
   - Host of student-interns
   - Placement of graduates
Supporting students’ graduation thesis

Sharing and transferring knowledge from/to company

Partnership in Research & Development projects

Participation in joint events and/or networks/clusters/meetings

Development of innovative companies, including spin-offs and start-up companies

Other (please specify) ________________________

3. If “NO”, please provide the reasons that discourage you from cooperating with a footwear company.

4. This project will set up a Knowledge Platform for footwear manufacturing that facilitates the collaboration towards innovation and technological transfer among universities, companies and research centres. Are you interested in becoming part of this Knowledge Community?

☐ Yes

☐ No

5. If you choose YES, please indicate your interests among the following areas (multiple answers possible):

☐ Evaluation and validation of the Knowledge4Footwear platform content (e.g. training needs, training curriculum and content for virtual internships)

☐ Participation at events organised by Knowledge4Footwear platform (e.g. brokerage sessions for identifying project ideas, conference)
6. If you choose NO, please indicate your reason (multiple answers possible):

☐ No resources (e.g. lack of human resources, lack of time, lack of money)
☐ Not a priority in our current organisation’s strategy
☐ Other (please specify) __________________________

Section C - Role of education and research in fostering innovation

Definition 1: “An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” (Source: OECD, Oslo Manual. Guidelines for collecting and interpreting innovation data, p.46, available at http://ec.europa.eu/eurostat/documents/3859598/5889925/OSLO-EN.PDF)

1. Do you consider that HE students/graduates need advanced training for performing Research, Development and Innovation activities?

☐ Yes
☐ No

2. Do the current study programmes of the universities stimulate creative thinking and problem solving approach among their students/graduates?

☐ Yes
☐ No

3. Please indicate what actions should be taken by the education and training providers to encourage students to deal with the footwear industry requirements for innovation. (multiple answers possible)
Mapping the knowledge triangle for transferring research and innovation in footwear manufacturing

K4F project will develop a training programme focused on research, development and innovation for the footwear sector. Please evaluate the importance of the following knowledge/skill in relation with the future training programme (multiple answers possible).

<table>
<thead>
<tr>
<th>Knowledge/Skill</th>
<th>NOT important</th>
<th>Of some importance</th>
<th>Important</th>
<th>Very important</th>
<th>Extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td>to demonstrate broad knowledge on the footwear products’ processes and related technology/machinery, including all phases of footwear manufacturing and different types of construction, design techniques, raw materials and components</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to elaborate and to apply the procedures and tools for a Research and Development Management System, including new product development, technology development, process development, technological transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to carry out projects in relation to the latest developments on new materials and components for footwear</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to develop new footwear concepts and products based on specific requirements of various customers and market trends</td>
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<td>to carry out projects in relation to the latest developments</td>
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<td>on new manufacturing technologies and business models</td>
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<td>to comply with the available legislation, regulations,</td>
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<td>certifications and standards regarding products and</td>
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<td>manufacturing processes</td>
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<td>to demonstrate soft skill adapted to complex projects and</td>
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<td>working situations, such as: creative and critically thinking,</td>
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<td>solving problems, team working, entrepreneurial thinking</td>
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Please state other comments/ observations/ proposals

Thank you for your time and support in completing this questionnaire.