

# Knowledge Platform for Transferring Research and Innovation in Footwear Manufacturing

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## Partners

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



## Why Knowledge4Foot ?

- ❑ Business operating staff (engineers, technicians) are not sufficiently trained and do not have the skills needed to be **directly and effectively integrated into Research, Development and Innovation (RDI) teams**
- ❑ Students/graduates are not familiar with the latest research, trends and opportunities to grow a business in the field. Lack of knowledge, skills and competencies related to **research, development and technology transfer**.
- ❑ The **internship / placement activities** carried out by students are very limited and they are oriented towards professional training for the acquisition of skills related to traditional processes and technologies



### AIM

Excellence in tertiary level of training and education for design, product development, engineering and management by connecting the three areas of the **knowledge triangle**:

- **Education**
- **Research**
- **Business**



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

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This study provides a detailed overview of the labor market requirements in the footwear industry for highly qualified staff with an optimal combination of transversal and professional competencies to stimulate **the transfer of the latest innovative added value products and processes into the footwear manufacturing.**

### Links:

[http://www.knowledge4foot.eu/site/assets/files/1042/k4f\\_integrated\\_report\\_final.pdf](http://www.knowledge4foot.eu/site/assets/files/1042/k4f_integrated_report_final.pdf)

<http://online.fliphtml5.com/yqaa/scey/#p=1>



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

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

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- The partners analyzed how **project-based training** is reflected in the study and training programs addressing qualification levels 5, 6 and 7 (European Qualifications Framework).
- **Gaps and mismatches** have been identified in terms of skills and competencies related to the training needs identified in the labor market.
- Results of research conducted by partners in **Romania, Greece, Portugal, Spain and Croatia**:
  - ✓ Analysis of the footwear sector,
  - ✓ Analysis of existing study and training programs,
  - ✓ The inventory of research, development and innovation (RDI) needs in the footwear sector,
  - ✓ Identifying relevant research development projects as well as good practice and initiatives demonstrating the link between universities, technology centers and industry firms.
- **Study on installed capacity to perform research, development and innovation in footwear manufacturing**. Two types of questionnaires were applied, to which 108 experts from the footwear firms, respectively 52 teachers and researchers from 22 universities and research centers, responded.





# Training program and e-learning content for transferring research and innovation

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❑ Training courses are focused on the development of skills and competences in research, innovation and technology transfer, applied in the field of footwear manufacturing.

❑ For a training program totaling 125 hours / 9 ECTS credits, the partners develop the content for three courses, each consisting of 4 modules (12 in total)

❑ 3 e-books in 6 languages

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Knowledge Platform for Transfe



Ki ecobe is a DIY (do it yourself) assembled modular shoe that uses no toxic adhesives. The end user brings together all components of the shoe, making the manufacturing process much less labor intensive.



Ki ecobe é um sapato modular montado DIY (do it yourself) que não usa adesivos tóxicos. O usuário final reúne todos os componentes do sapato, tornando o processo de fabricação muito menos intensivo em mão-de-obra.



Ki ecobe je DIY (to sebi) sastavljena modularna cipela koja ne koristi toksične ljepila. Krajnji korisnik okuplja sve dijelove cipele, čineći proizvodni proces znatno manje radne snage.



Ki ecobe este o încălțăminte modulară tip DIY (do it yourself- fă cu mâinile tale), a cărei părți componente sunt asamblate cu adeziv nontoxic. În final utilizatorul îmbină componentele, procesul de fabricație fiind unul foarte simplu.



Ki ecobe es un zapato modular ensamblado de bricolaje (hágalo usted mismo) que no utiliza adhesivos tóxicos. El usuario final reúne todos los componentes del calzado, lo que hace que el proceso de fabricación sea mucho menos laborioso.



Ki ecobe είναι ένα DIY (το κάνετε μόνοι σας) συναρμολογημένο αρθρωτό παπούτσι που δεν χρησιμοποιεί τοξικές κόλλες. Ο τελικός χρήστης συγκεντρώνει όλα τα εξαρτήματα του παπουτσιού, καθιστώντας τη διαδικασία κατασκευής πολύ λιγότερο εντατική στην εργασία.

Creativitate și inovație în industria încălțămintei

Criatividade e inovação para a indústria do calçado

Creatividad e innovación para la industria del calzado

Kreativnost i inovacije za industriju obuće

Δημιουργικότητα και καινοτομία για τη βιομηχανία υ



Figure 5. Ki ecobe modular concept. Source: <https://www.kicstarter.com/projects/1121278858/ki-ecobe-customizable-self-assembled-footwear?token=7ca10499>

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## MODULE 1



### • Unit 1: R&D in European projects

- Horizon 2020
- SME Instrument
- INNOSUP
- [Eurostars](#)

### • Unit 2: Preparation of a proposal for H2020

- Internal Analysis in the Company
- Partnership
- IPR, Communication and Exploitation

### • Unit 3: Budget and financial management

### • Unit 4: Submission of a H2020 proposal

### • Assessment/Virtual Internship- Writing a Project Proposal for H2020- SME Instrument





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## MODULE 2



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Lesson 1.2. Approaches to the consumer-oriented footwear design

TOPICS

- Trends that shape consumer's behaviour
- How to know what a customer needs and desires
- How to involve a consumer into the designing process

Figure 6. Gamification web interface by BRAND your shoes

A group of Spanish companies launched a common platform, namely Brand your shoes under the Full ID-Custom® System, that allows to create customised sneakers, starting from several blank models.

2015-1-R01-L4

Erasmus+

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Study case 2

Developing a footwear collection based on visual stimuli

TOPICS

- Finding inspiration
- Developing a story
- From sketches to study drawings
- Making models
- Explaining the design concept

Figure 14. Shoeconcept inspired by a statue

[Author of photos and models: Irena Vapic, 2016.]

Erasmus+

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Lesson 3.3. 3D modeling and 3D printing

TOPICS

- 3D modelling software and tools
- Preparation for 3D printing
- Parameter setting on 3D printer
- 3D printing

Figure 8. Positioning of model on MakerWare on workspace of MakerBot Replicator 2X

Adjusting the layer height or print resolution, alters the 3D print surface quality. The device's settings offer three print quality options: Low resolution of 0.3 mm, Standard of 0.2 mm and High of 0.1 mm per layer

Figure 9. Examples of the print quality, 3D density, and number of exterior layers in the MakerWare dialog box

Erasmus+

### Unit 1: Footwear design-driven innovation

- Design tools, methods and practices
- Approaches to the consumer-oriented footwear product design

### Unit 2: Product-related innovation

- Innovative materials and components for footwear
- Engaging engineering tools for innovative footwear

### Unit 3: Design-driven additive manufacturing

- What is additive manufacturing?
- Application of additive manufacturing in footwear design
- 3D modelling and 3D printing

### Unit 4: Footwear product development. Study cases

- Study case 1- Prototyping footwear insole based on foot measurements
- Study case 2- Developing a footwear collection based on visual stimuli

### Test Quiz

**Assignment** - Draft idea for a CASE Study of an Innovative Footwear



# Training program and e-learning content for transferring research and innovation

## MODULE 3

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Lesson 1.2. The Technology Transfer Networks (TTN)

**TOPICS**

- Technology transfer networks (TTN) context
- Economy regarding the technology transfer networks (TTN)
- Critical elements of technology transfer networks (TTN)

Major stakeholders of technology transfer networks (TTN)

It should be underlined that technology transfer process from academic to companies and from research institutes to companies is important to operate current technological capability for industrial development; in this way, research institutes and universities will gain from this relationship (technology transfer activities) with industry (Kondo, 2001).

There are different modalities to facilitate this relationship / collaboration between academic, industrial companies and research institute—see Table from next slide.

- **Unit 1: Introduction to Technology Transfer**
  - What is Technology Transfer
  - The Technology Transfer Networks
- **Unit 2: Process Innovation and Emerging Technologies**
  - New equipment with high contents of technology
  - New ICT systems interacting with manufacturing and managements
  - Technology Assessment - Value Proposition
  - Integrating Technology
- **Unit 3: Intellectual Property Rights**
  - Types of IPR
  - IPR Strategy
- **Unit 4- Workshop: Entrepreneurship and Business Planning. How to elaborate a business plan?**
- **Test Quiz**

# Multimedia handbook for project based training and virtual placement of HE students and trainees from SMEs

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- The content of the multimedia manual is addressed to both students and tutors

## Knowledge4Foot Platform Guide for Students

### Content

#### 1. Starting your virtual internship

- 1.1 Platform Log in
- 1.2 Platform main page
- 1.3 Profile Setup
- 1.4 Accessing the courses
  - 1.4.1 Transferring Research and Innovation into Footwear Manufacturing
  - 1.4.2 Virtual Internship and Project Based Training
- 1.5 Navigation panel

#### 2. Communicating on the platform

- 2.1 Forums
  - 2.1.2 Announcements forum
  - 2.1.2 Questions and Doubts forum
  - 2.1.3 How to use the forums
- 2.2 Private messages

#### 3. On line assessment

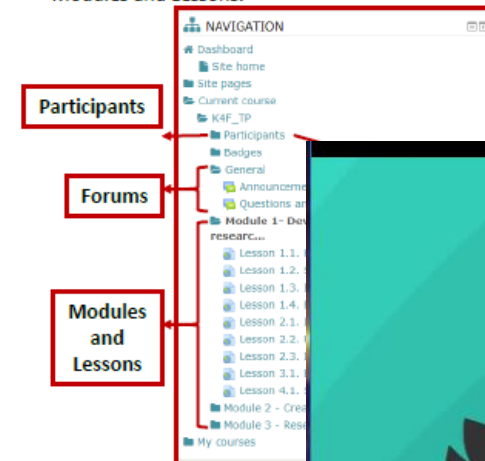
- 3.1 Test Quiz
- 3.2 Assignment
- 3.3 Team Project Work



#### 1.5 Navigation panel

You can use the navigation tree panel to access directly the components of the courses:

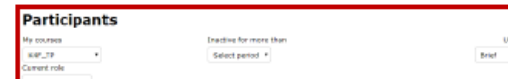
- Participants;
- Forums;
- Modules and Lessons.



By accessing the Participants section (name, email, city, country).



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# Knowledge4Foot Platform

## SECTIONS

- **ONLINE TRAINING**
  - Module 1- Developing project proposals for research and innovation in footwear enterprises
  - Module 2 - Creativity and innovation for footwear industry
  - Module 3 - Research and Technological Transfer
- **GUIDELINES FOR PROJECT BASED TRAINING THROUGH VIRTUAL PLACEMENT OF STUDENTS**
  - Student's handbook
  - Supervisor's handbook
- **INTENSIVE SUMMER TRAINING COURSE ON ENTREPRENEURIAL THINKING IN FOOTWEAR AND LEATHER SECTOR – Book of lectures**
- **VIRTUAL BROKERAGE**
- **R&I PROJECTS FOR FOOTWEAR MANUFACTURING** is a project management tool that allows for:
  - collecting needs as requirements,
  - describing solution with specifications,
  - and controlling development task within a milestone schedule
  - for providing deliverables
  - that will be reviewed and validated

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The screenshot displays the Knowledge4Foot (K4F) platform interface. The top navigation bar includes 'K4F', 'English (en)', 'My courses', and 'This course'. The main content area is titled 'Transferring Research and Innovation into Footwear Manufacturing' and features a 'General' section with a banner image and links for 'Announcements' and 'Questions and Doubts'. Below this, three modules are listed: 'Module 1- Developing project proposals for research and innovation in footwear enterprises' (URLs: 9), 'Module 2 - Creativity and innovation for footwear industry' (URLs: 9, Quiz: 1, Assignment: 1), and 'Module 3 - Research and Technological Transfer' (URLs: 8, Quiz: 1). The right sidebar contains a 'NAVIGATION' menu, a 'SEARCH FORUMS' box, 'LATEST ANNOUNCEMENTS', a 'CALENDAR' for April 2018, and an 'EVENTS KEY'. The bottom of the page features a footer with logos of partner institutions: CTCP, INESCOP, virtualcampus, Technical University of Crete, University of Zagreb, and cre thi dev.

# Students' PROJECT IDEAS and VIRTUAL BROKERAGE

- 10 multinational teams with 60 students from RO, HR, GR working in a virtual environment offered by K4F Platform
- 25 companies from Romania, Greece, Spain, Portugal and Croatia participating in one Brokerage Session
- 14 Project IDEAS/topics:

☐ **Opportunities of 3D printing in footwear** (such as: design optimisation; design by local and small brands; re-design and personalisation)

☐ **From eco-friendly to eco-intelligent footwear** (such as: eco-design and environmental technologies as a competitive advantage; How to minimise waste or emissions in footwear manufacturing, Biodegradable shoes , recycling, up-cycling and re-using )

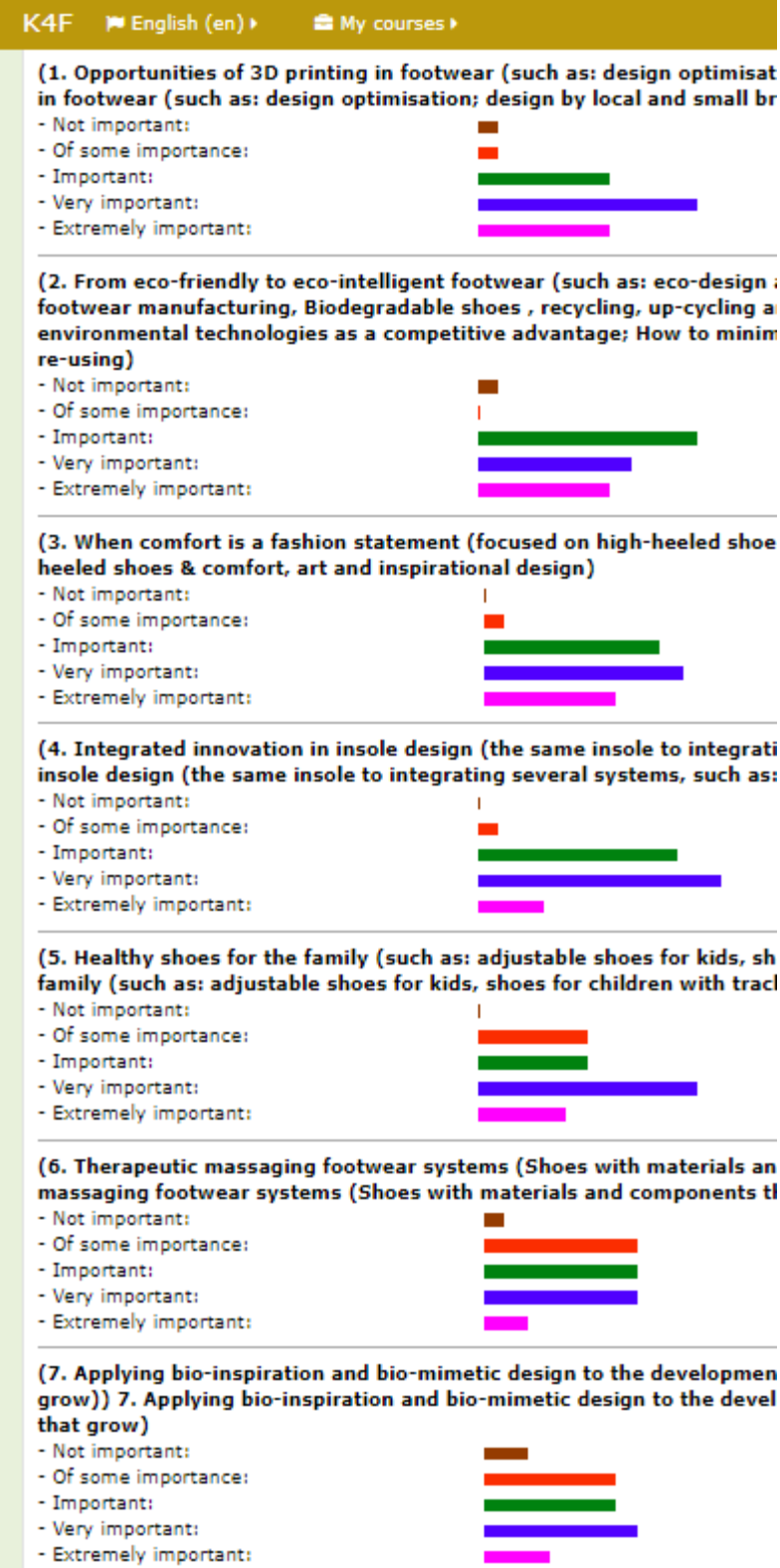
☐ **When comfort is a fashion statement** (focused on high-heeled shoes & comfort, art and inspirational design)

☐ **Integrated innovation in insole design** (the same insole to integrating several systems, such as: heating, shock absorbing, pain relief etc.)

☐ **Healthy shoes for the family** (such as: adjustable shoes for kids, shoes for children with tracking system, footwear for pregnant women )

☐ **Therapeutic massaging footwear systems** (Shoes with materials and components that massage feet during movement for therapeutic purposes)

☐ **Applying bio-inspiration and bio-mimetic design to the development of the footwear concept** (such as: chameleon shoes; smart shoes that change colour; shoes that grow)





# Students' PROJECT IDEAS and VIRTUAL BROKERAGE

- **Optimum design for a multipurpose shoe** (shoes with detachable soles, heels or platforms; uppers and bottoms can be interchanged to have the right shoe for each activity- travel, walk, sport etc.)
- **ALL in ONE** (interchangeable uppers to get several models or construction types, the same shoe to be adapted for various activities, on different walking surfaces, etc.)
- **Smart Shoes by integrating wearable technology** (sensors to track users activity, to detect fatigue or stress, to prevent fall and injury in elderly, to provide heating inside the shoe, to use walking energy for charging personal devices, etc.)
- **Personalised shoes for ageing people** (focused on comfort in relation with various healthy issues of the ageing people)
- **Shoes for a zero waste lifestyle** (methods for improve quality and minimize costs in footwear industry, zero waste footwear design)
- **Digital value creation in footwear industry** (how brands will look like in 2050?, fashion and digitalization, footwear company in digital era, digital and social media marketing, etc.)
- **Fast fashion versus sustainable fashion** (focused on supply chain management, sustainability and business models in footwear industry)

(8. Optimum design for a multipurpose shoe (shoes with detachable soles, heels or platforms; uppers and bottoms can be interchanged to have the right shoe for each activity- travel, walk, sport etc.)) 8. Optimum design for a multipurpose shoe (shoes with detachable soles, heels or platforms; uppers and bottoms can be interchanged to have the right shoe for each activity- travel, walk, sport etc.)



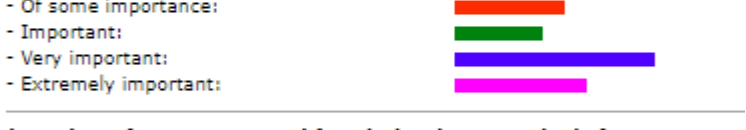
(9. ALL in ONE (interchangeable uppers to get several models or construction types, the same shoe to be adapted for various activities, on different walking surfaces, etc.)) 9. ALL in ONE (interchangeable uppers to get several models or construction types, the same shoe to be adapted for various activities, on different walking surfaces, etc.)



(10. Smart Shoes by integrating wearable technology (sensors to track users activity, to detect fatigue or stress, to prevent fall and injury in elderly, to provide heating inside the shoe, to use walking energy for charging personal devices, etc.)) 10. Smart Shoes by integrating wearable technology (sensors to track users activity, to detect fatigue or stress, to prevent fall and injury in elderly, to provide heating inside the shoe, to use walking energy for charging personal devices, etc.)



(11. Personalised shoes for ageing consumers (focused on comfort in relation with various healthy issues of the ageing people)) 11. Personalised shoes for ageing consumers (focused on comfort in relation with various healthy issues of the ageing people)



(12. Shoes for a zero waste lifestyle (such as : methods for improve quality and minimize costs in footwear industry, zero waste footwear design)) 12. Shoes for a zero waste lifestyle (such as : methods for improve quality and minimize costs in footwear industry, zero waste footwear design)



(13. Digital value creation in footwear industry (such as: how brands will look like in 2050?, fashion and digitalization, footwear company in digital era, digital and social media marketing, etc.)) 13. Digital value creation in footwear industry (such as: how brands will look like in 2050?, fashion and digitalization, footwear company in digital era, digital and social media marketing, etc.)



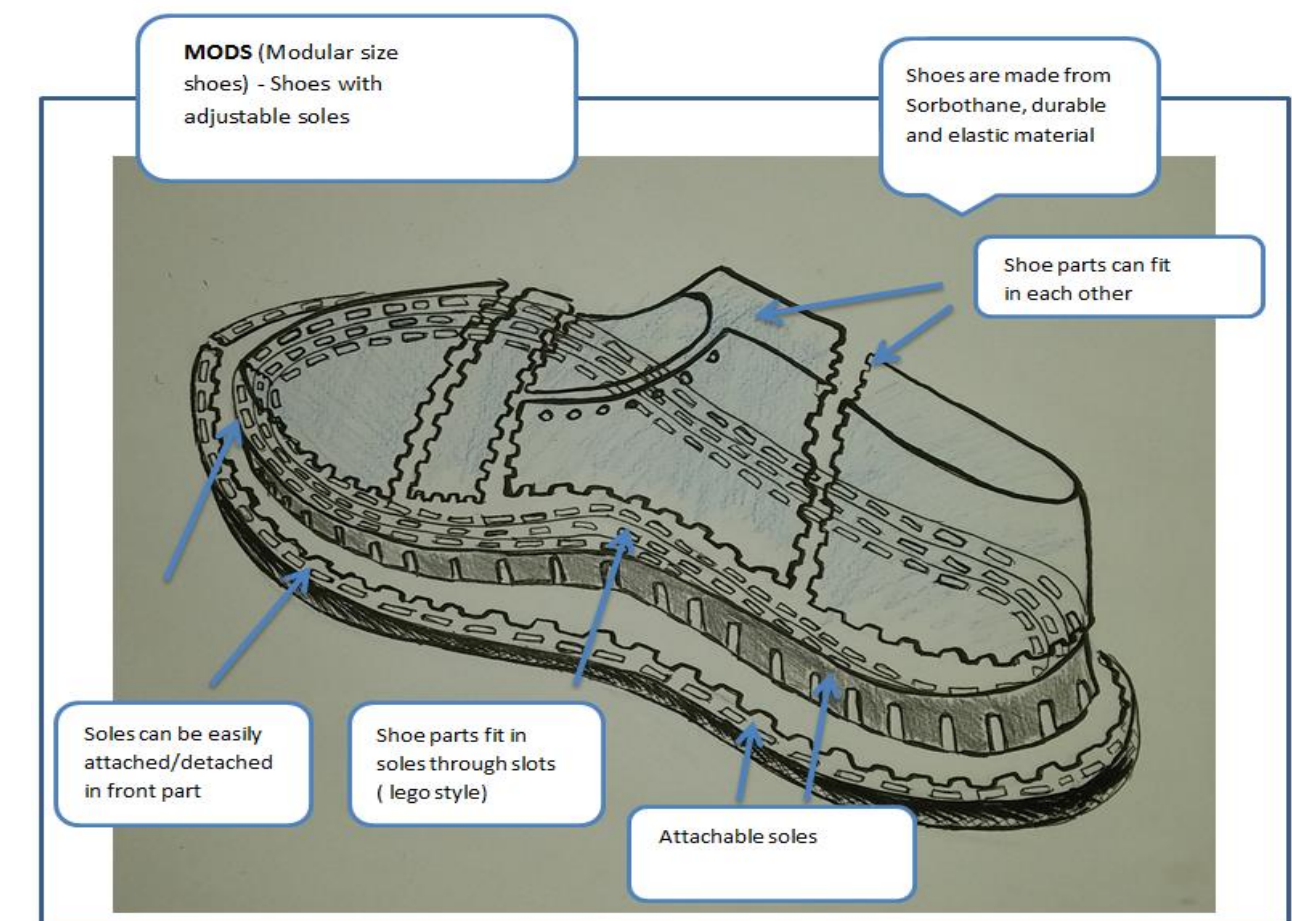
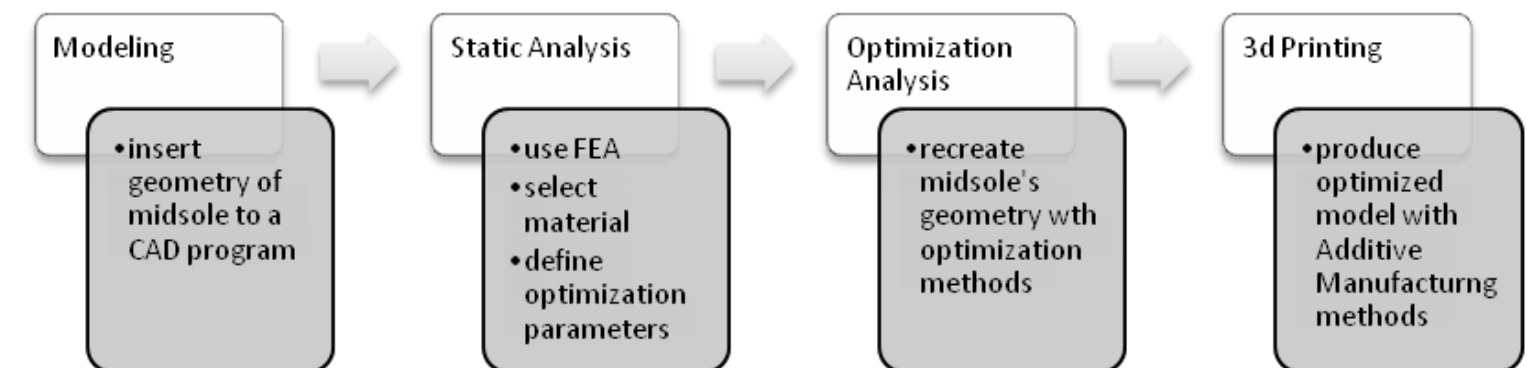
(14. Fast fashion versus sustainable fashion (focused on supply chain management, sustainability and business models in footwear industry)) 14. Fast fashion versus sustainable fashion (focused on supply chain management, sustainability and business models in footwear industry)



- 10 multinational teams with 60 students from RO, HR, GR working in a virtual environment offered by K4F Platform

## ❑ 5 Awarded projects ideas

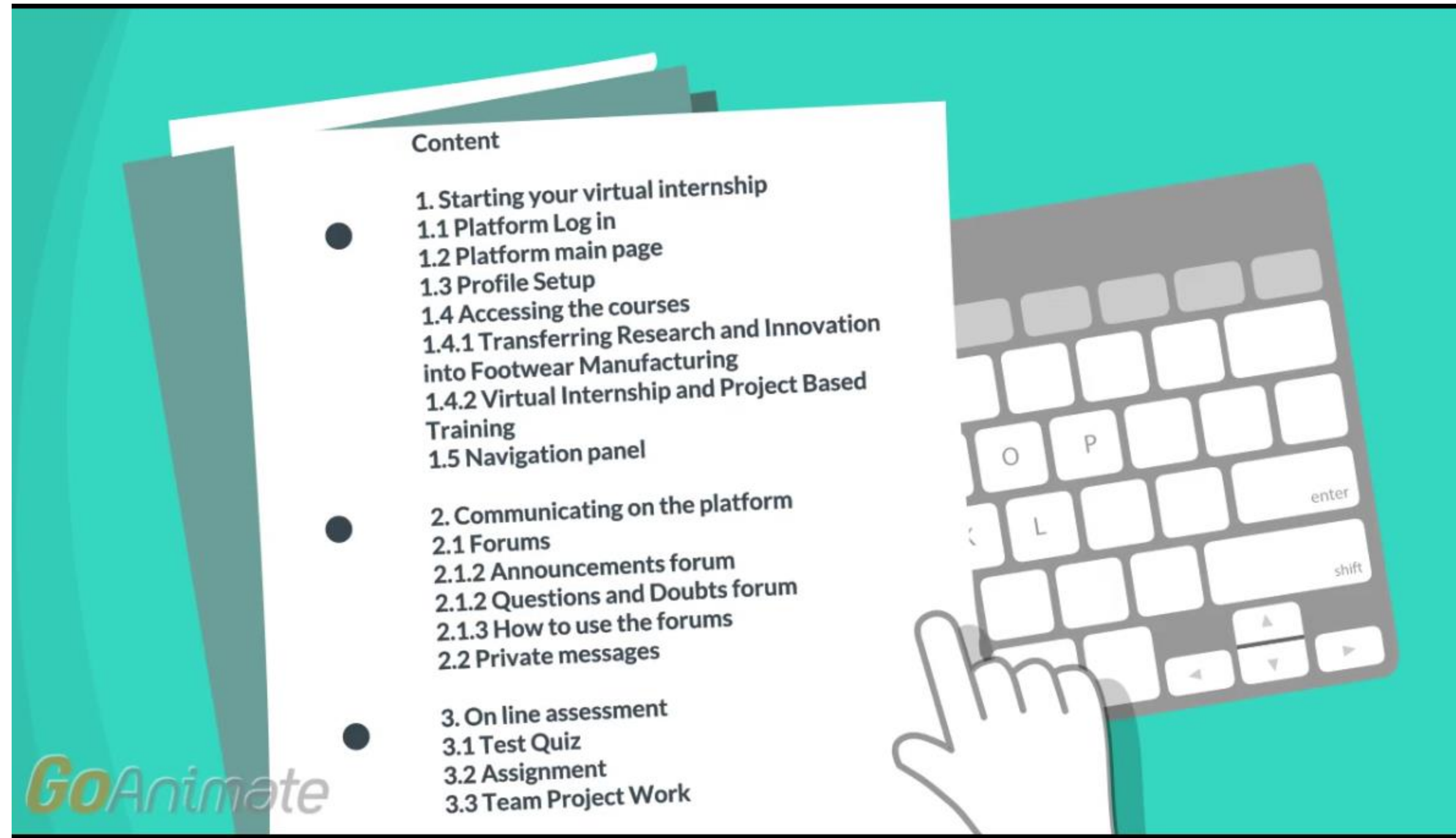
- Redesigning the high-heels for 3D printing: midsoles and materials
- Applying bio-inspiration and bio-mimetic design to the development of the footwear concept
- Modular shoes with adjustable size
- ALL-IN-ONE
- Multifunctional insole to prolong the active and healthy life of the elderly



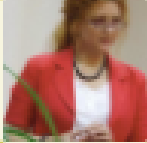
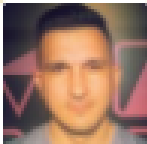

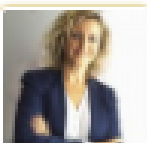

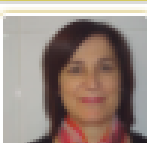
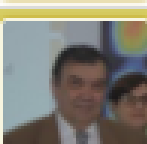
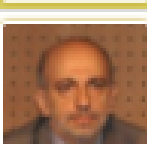
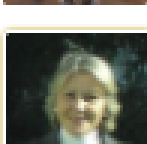
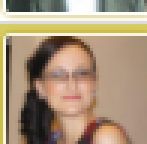










- DEMO- How to use the [Knowledge 4 Foot Platform](#)

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## Knowledge 4 Foot TEAM

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[www.knowledge4foot.eu](http://www.knowledge4foot.eu)

<https://www.facebook.com/K4Fproject/>



***WE bridge the world of Education,  
Bussines and Research !***

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### Knowledge Platform for Transferring Research and Innovation in Footwear Manufacturing

*Agreement No. 2015-1-RO01-KA203-015196 , Period: 2015-2018*

Fostering the excellence in tertiary level of training and education for design, product development, engineering and management by connecting the three areas of the knowledge triangle: Education, Research and Business.

*We bridge the world of Education, Research and Business!*



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