

## Innovative 3D training platform for recycling of waste electric and electronic devices

540527-LLP-1-2013-1-GR-LEONARDO-LMP

<http://www.adam-europe.eu/adam/project/view.htm?prj=10974>

## Project Information

Title: Innovative 3D training platform for recycling of waste electric and electronic devices  
Project Number: 540527-LLP-1-2013-1-GR-LEONARDO-LMP  
Year: 2013  
Project Type: Development of Innovation  
Status: running  
Country: EU-Centralised Projects  
Marketing Text: The project's objective is the development of ICT-based self- and distance learning training courses familiarizing learners/users with the disassembly of Electrical and electronic devices and the identification of types and qualities of materials embodied. It targets both low level workforce, aiming at strengthening employability, safety at work and developing skills as well as higher employers (materials identification) covering a crucial training gap in the WEEE industry. The training material will be prepared in the form of scenarios, will be enhanced with multimedia material and developed so as to take the form of 3D training scenarios. The scenarios will in turn be transformed into 3D situations through Virtual Environment applications simulating the real world. In these, 3D virtual representations of real devices will be enacted. The beneficiaries will thus be able to participate in simulations of real-life situations (based on the training scenarios) and disassembly the devices.

Summary: The production of Electric and Electronic equipment is one of the most developing sectors of the universal industrial production. This development makes these products as one of the most important waste categories that need to be treated properly. In the last decade, significant efforts towards the management of this problem were noted, due to the fact that the life time of these products is reducing. One crucial element of the recycling process is the early identification and removal of the toxic parts of the aforementioned products. Then the screening and disassembly of the different parts of each device follows, and the different materials are forwarded to the relevant factories. Knowledge is a key point of this procedure. Due to the huge number of different manufacturers, and the evolution of the relevant industries, it becomes sometimes hard to identify all parts of the devices and handle them properly (remove safely, try not to damage them). RECDEV project's objective is the development of ICT-based self- and distance learning training courses familiarizing learners/users with the disassembly of Electrical and electronic devices and the identification of types and qualities of materials embodied. It targets both low level workforce(disassembly), aiming at strengthening employability, safety at work and developing skills as well as higher employers (materials identification) covering a crucial training gap in the WEEE industry. The training material will be prepared in the form of scenarios, will be enhanced with multimedia material and developed so as to take the form of 3D training scenarios. The scenarios will in turn be transformed into 3D situations through Virtual Environment applications (ICT) stimulating the real world. In these 3D virtual representations of real devices will be enacted. The beneficiaries/learners will thus be able to participate in simulations of real-life situations (based on the training scenarios) and disassembly the devices.

Description: With traditional face to face training, we have to draw expensive resources whereas we don't achieve a high recall rate of the learners. On the contrary, the proposed ICT virtual training environment will offer learners the possibility to apply the acquired knowledge in training scenarios, as many times as they need, from wherever they are addressing cultural diversities, thus provides a European dimension in systems and practices in the field.

Themes: \*\*\* Sustainability  
\*\*\* ICT  
\*\*\* Enterprise, SME  
\*\*\* Ecology  
\*\* Labor market

## Project Information

- \*\* Lifelong learning
- \*\* Vocational guidance
- \*\* Continuous training

Sectors: \*\*\* Water Supply; Sewerage, Waste Management and Remediation Activities  
\*\*\* Education  
\*\* Other Service Activities

Product Types: DVD  
others  
website  
program or curricula  
CD-ROM  
teaching material

Product information: RECDEV project comes to offer a brand new solution to these barriers by the development of specialized training methodology and content for the disassembly of electric and electronic devices and the identification of the type and quality of materials in these. The training material for the disassemblers, will be developed in the form of scenarios for 3D environments allowing the users to learn of the geometry and parts of each different device, disassembling it to the virtual world with less text and more sound and animation instructions, before it performs it to the actual device. The training material for the higher level personnel will be offered also in 3D scenarios, but with the help of an ontology they will be able to access further information around the devices, the materials for recycling, how to identify the quality of different parts, and their potential exploitation (who would buy them). The advantage of the RECDEV project is that the 3D training scenarios will be easily updated by non expert content authors that they will be able with drag and drop parts to present different variations of the EEE devices, manufacturers' tips and other best practices. The 3DCMS will be based on partner's OMEGATECH 3DCMS, that will be customized to offer the desired functionality for WEEE devices. The pedagogical methodology behind the project idea is based in an adaptation of the 'learning by doing' method to the singularities of the recycling sector, utilizing the interactivity and the simulation offered by virtual worlds. Using realistic disassembly physics, RECDEV scenarios will simulate the experience of taking everyday objects apart. Screws, bolts, nuts and every single part will be able to be removed by touch dragging in full stereoscopic 3D. Trainees will be able to interact, use and disassemble the object intuitively by just touching and dragging the parts. Camera will be controllable allowing the trainee to zoom in or out. The proposed project falls under the Development of innovative ICT-based content, pedagogies, practices and services Leonardo Da Vinci operational objective, and under the action Multilateral projects for the Development of Innovation (DOI). The duration of the project will be three years; Twelve months will be devoted to pilot implementation. There is already interest for Recycling Factories (see annexed letters of intent) to exploit the benefits of the training tools. The participation of real users to the pilot implementation phase is ensured as well as that the project outputs are going to cover real users' needs. The problems that the project is going to cover have already identified in research work and study visits to the same recycling factories. The project's outputs will be available in several languages (English, French, Greek, Slovenian, Czech, Austrian and Romanian). The methodology and tools will be developed to with aim to be easily extended to other industries beyond the WEEE recycling sector. The proposal clearly addresses the strategic priority "NEW – Sector Skills Alliances - Activities" of the Leonardo Da Vinci, Development of Innovation projects. Additionally, project partners aim during the exploitation phase of the project to devote significant effort for the identification of the needs in the area of recycled materials utilization. This study, will identify new methods of how can the use of the materials collected can lead to new jobs inside each country. There are cases were the factories pay to give away the recycled parts (due to environmental legislation), while these can be cleaned from dangerous substances and utilized through innovative techniques and reused to innovative products. The consortium will survey this field, with objective to identify best practices that create new job opportunities in the sector. The participating organizations also share the experience that traditional face

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to face training, draw expensive resources and don't achieve a high recall rate on the contrary with the proposed ICT virtual environments that will offer the learners the possibility to apply the acquired knowledge in training scenarios (equipment disassembly) as many times as they need, from wherever they are, to interact with other learners, thus bridging the gap between theory and practical experience. The participating universities will define the training methodology and integration framework with the national VET systems. The consortium brings together the resources of 7 participating organizations from 5 countries including 3 partners with expertise in Recycling, Environmental Protection and Waste Management (ARVIS SA, Hellenic Solid Waste Management Association and the NCSPC), 2 universities with research work in the recycling sector (Un. of Maribor and Mendel Un of Brno), a consulting company dealing with implementation of sustainable development with a special emphasis on preventive environmental protection (STENUM), as well as a strong technological partner with expertise in 3D content management systems (Omegatech).

Projecthomepage: <http://www.recdev.eu>

## Project Contractor

Name: ARVIS ENVIRONMENTAL ENTERPRISES OF GREECE SA  
City: Athens  
Country/Region: Attiki  
Country: EL-Greece  
Organization Type: SME - small and medium-sized enterprise (up to 250 employees)  
Homepage: <http://www.arvis.gr>

## Contact Person

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## Coordinator

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City: Athens  
Country/Region: Attiki  
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Organization Type: SME - small and medium-sized enterprise (up to 250 employees)  
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## Partner

### Partner 1

Name: T. Alexandridis & CO (Omega technology)  
City: Athens  
Country/Region: Attiki  
Country: EL-Greece  
Organization Type: SME - small and medium-sized enterprise (up to 250 employees)  
Homepage: <http://gr.omegatechnology.biz/>

### Partner 2

Name: Hellenic Solid Waste Management Association  
City: Athens  
Country/Region: Attiki  
Country: EL-Greece  
Organization Type: association/non-governmental organisation  
Homepage: <http://www.eedsa.gr/>

### Partner 3

Name: Mendel University of BRNO  
City: Brno  
Country/Region: Moravskoslezsko  
Country: CZ-Czech Republic  
Organization Type: university/Fachhochschule/academy  
Homepage: <http://www.mendelu.cz/en>

### Partner 4

Name: Faculty of Chemistry and Chemical Engineering – University of Maribor  
City: Maribor  
Country/Region: Slovenija  
Country: SI-Slovenia  
Organization Type: university/Fachhochschule/academy  
Homepage: <http://www.uni-mb.si>

## Partner

### Partner 5

Name: Stenum GmbH  
City: Graz  
Country/Region: Lower Austria  
Country: AT-Austria  
Organization Type: SME - small and medium-sized enterprise (up to 250 employees)  
Homepage: <http://www.stenum.at>

### Partner 6

Name: National Centre of Sustainable Consumption & Production  
City: Timisoara  
Country/Region: Bucuresti  
Country: RO-Romania  
Organization Type: association/non-governmental organisation  
Homepage: <http://www.denkstatt.ro>

## Project Files

### Images from the Kick off Meeting.docx

<http://www.adam-europe.eu/prj/10974/prj/Images%20from%20the%20Kick%20off%20Meeting.docx>

### Preparatory Visit at EKAN SA.docx

<http://www.adam-europe.eu/prj/10974/prj/Preparatory%20Visit%20at%20EKAN%20SA.docx>

### PublicPart\_Report\_Ilp\_en FINAL RECDEV.pdf

[http://www.adam-europe.eu/prj/10974/prj/PublicPart\\_Report\\_Ilp\\_en%20FINAL%20RECDEV.pdf](http://www.adam-europe.eu/prj/10974/prj/PublicPart_Report_Ilp_en%20FINAL%20RECDEV.pdf)

Public Part of the submitted and approved Interim Report.

### RECDEV Project Kickoff Agenda.docx

<http://www.adam-europe.eu/prj/10974/prj/RECDEV%20Project%20Kickoff%20Agenda.docx>

kick off meeting Agenda

### REDEV ATTENDANCE LIST KICK OFF MEETING.pdf

<http://www.adam-europe.eu/prj/10974/prj/REDEV%20ATTENDANCE%20LIST%20KICK%20OFF%20MEETING.pdf>

### WP\_3\_Development of the training methodology and scenarios.rar

[http://www.adam-europe.eu/prj/10974/prj/WP\\_3\\_Development%20of%20the%20training%20methodology%20and%20scenarios.rar](http://www.adam-europe.eu/prj/10974/prj/WP_3_Development%20of%20the%20training%20methodology%20and%20scenarios.rar)

WP3 FINAL DELIVERABLES

### WP\_4\_Development and setup of the virtual environments.rar

[http://www.adam-europe.eu/prj/10974/prj/WP\\_4\\_Development%20and%20setup%20of%20the%20virtual%20environments.rar](http://www.adam-europe.eu/prj/10974/prj/WP_4_Development%20and%20setup%20of%20the%20virtual%20environments.rar)

WP4 DRAFT DELIVERABLE

## Products

- 1 Innovative 3D VET for Technical Staff and Executive Staff in WEEE Industry
- 2 Web portal - User Forum
- 3 Two Scientific Papers
- 4 Business Plan
- 5 DVDROM and Informative brochure
- 6 3 Workshops
- 7 Content outline and Ontology
- 8 Training material framework and specifications
- 9 RECDEV 3D training platform

## Product 'Innovative 3D VET for Technical Staff and Executive Staff in WEEE Industry'

Title: Innovative 3D VET for Technical Staff and Executive Staff in WEEE Industry

Product Type: teaching material

Marketing Text: RECDEV proposes a brand new solution to the training around WEEE recycling, offering 3D training tools.

This project focuses on WEEE and utilizes 3D technology in the disassembly training for WEEE.

The use of virtual technologies and the innovative training pedagogies they offer (learning by doing) are going to lead to the enhancement and transformation of existing training material to interactive content, offering attractive and instructive disassembly and material identification courses to people not used to read big manuals and technical details.

The training material for the disassemblers, will be developed in the form of scenarios for 3D environments allowing the users to learn of the geometry and parts of each different device, disassembling it to the virtual world with less text and more sound and animation instructions, before it performs it to the actual device.

Description: The pedagogical methodology behind the project idea is based in an adaptation of the 'learning by doing' method to the singularities of the recycling sector, utilizing the interactivity and the simulation offered by virtual worlds. Using realistic disassembly physics, RECDEV scenarios will simulate the experience of taking everyday objects apart. Screws, bolts, nuts and every single part will be able to be removed by touch dragging in full stereoscopic 3D. Trainees will be able to interact, use and disassemble the object intuitively by just touching and dragging the parts. Camera will be controllable allowing the trainee to zoom in or out.

Target group: The current training material targets low skilled workers and higher level employees involved in the WEEE recycling industry. The methodology and tools will be developed so as to be easily extended to other industries beyond the WEEE recycling sector.

Result: DVDROM and Informative brochure for the Technical and higher level Staff

Area of application: WEEE industry and Green Professions VET

Homepage:

Product Languages: Czech  
English  
French  
Greek  
Romanian  
Slovenian  
German

## Product 'Web portal - User Forum'

Title: Web portal - User Forum

Product Type: others

Marketing Text: Making information available and easily accessible is an important contribution to the result's dissemination of any EU funded project. In RECDEV project the dissemination and communication activities will aim to give a proper visibility of the project by creating appropriate visual and editorial support elements for all documents issued as well as by ensuring a regular information on the project's on-going progress and results obtained. This information will have to be prepared in such way that it will be understandable also for readers not having the same technical level of expertise as the project partners. A large number of publications will occur in highly reputed international conferences focused on the recycling Sector, workshops and journals based on the concept, vision, design and implementation results of the project all managed through a concise and constantly updated publication plan.

Description: A User Forum will be composed early in the project that will include representatives of all key stakeholders. The User Forum members will be invited at project Workshops and events, get early information on project developments, and will be requested annually to provide structure feedback to the project (through concise and short questionnaires or templates).

Target group: Representatives of all key stakeholders and User Forum's members

Result: A Web portal/forum with information on project's progress

Area of application: Communication of stakeholders and all interested parties in the WEEE Industry and Green Professions VET

Homepage:

Product Languages: Greek  
Romanian  
French  
German  
English  
Slovenian  
Czech

## Product 'Two Scientific Papers'

Title: Two Scientific Papers

Product Type: others

Marketing Text: Making information available and easily accessible is an important contribution to the result's dissemination of any EU funded project. In RECDEV project the dissemination and communication activities will aim to give a proper visibility of the project by creating appropriate visual and editorial support elements for all documents issued as well as by ensuring a regular information on the project's on-going progress and results obtained. This information will have to be prepared in such way that it will be understandable also for readers not having the same technical level of expertise as the project partners. A number of publications will occur in highly reputed international conferences focused on the recycling Sector, workshops and journals based on the concept, vision, design and implementation results of the project all managed through a concise and constantly updated publication plan.

Description: The partnership will produce two papers that will be forwarded to accredited scientific journals (indicatively such as Journal of Solid Waste Technology and Management, Scientific Journal International, International Journal of Environment and Waste Management (IJEWM), Nature etc.)

Target group: Scientific Academia and Relevant Technical and Business Sector

Result: Two Scientific Papers

Area of application: WEEE Industry and Green Professions VET

Homepage:

Product Languages: English

## Product 'Business Plan'

Title: Business Plan

Product Type: others

Marketing Text: One of the major tasks of the RECDEV project is the one related with the exploitation of the expected outcomes. This task is launched as soon as a clear description of the project expected outcomes has been documented and incorporates all actions involved in setting up the environment for exploiting the project's outputs & products and developing the required Business Plan. Setting up a successful commercialization case includes activities such as internal workshops in the participating organizations in order to acquire commitment for the required commercialization & re-engineering investment, presentations to potential investors for next round funding, liaisons establishment with regional vendors, distributors or business partners, cooperation with standardization bodies etc. as well as those involved in Products Patenting.

Description: This business plan will include the following basic categories of information:

- Market definition (size, state of development, type of users and competitors).
- Product definition and the reasons why a recycling company would want to use outcomes of the project
- Marketing strategy and estimated fees of the platform.
- Servicing costs and forecasts of profitability.
- Management and management control systems necessary to roll-out the Service, as part of a consolidated consortium.
- Financing requirements to launch the venture.
- Further steps that will offer added value to the platform such as the utilization of the recycled parts and how these can lead to innovative products that can create opportunities for further exploitation.
- Guidelines on how the product (methodology and tools) can be replicated for other industries.

Target group: WEEE Industry SMEs, Public Bodies, Policy Makers, Aspiring Business men/women, aspiring Technical and Executive staff in the relevant Sector

Result: Business Strategy Plan

Area of application: WEEE industry, Green Professions VET

Homepage:

Product Languages: English

## Product 'DVDROM and Informative brochure'

Title: DVDROM and Informative brochure

Product Type: DVD

Marketing Text: Making information available and easily accessible is an important contribution to the result's dissemination of any EU funded project. In RECDEV project the dissemination and communication activities will aim to give a proper visibility of the project by creating appropriate visual and editorial support elements for all documents issued as well as by ensuring a regular information on the project's on-going progress and results obtained. This information will have to be prepared in such way that it will be understandable also for readers not having the same technical level of expertise as the project partners. A large number of publications will occur in highly reputed international conferences focused on the recycling Sector, workshops and journals based on the concept, vision, design and implementation results of the project all managed through a concise and constantly updated publication plan.

Description: Regarding exploitation, the business partners aim to jointly mainstream and exploit the project results by the development of a joint legal entity that will undertake to commercialize the project's outputs.

Further Dissemination activities will include:

- Project informative Brochures
- A multimedia application presenting interviews with representatives of the factories participated to the project.
- Development of a stakeholders' list, recipients of the dissemination materials
- Several Newsletters with information on the projects progress
- Press releases to newspapers and web sites relevant to recycling

Target group: WEEE Industry Stakeholders and interested parties as well as Green Professions VET

Result: The deliverable consists of the multimedia DVDROM of the project and the informative brochures which will include every possible advertising material such as:

1. Informative Brochures
2. A multimedia application presenting interviews with representatives of the factories participated to the project
3. A List with stakeholders, recipients of the dissemination materials
4. Several Newsletters with information on the projects progress
5. Press releases to newspapers and web sites relevant to recycling

Area of application: WEEE Industry and Green Professions VET

Homepage:

Product Languages: Greek  
Romanian  
French  
German  
Czech  
English  
Slovenian

## Product '3 Workshops'

Title: 3 Workshops

Product Type: others

Marketing Text: The consortium will establish public relations with Officials from both government and regional institutions that play a positive role in the recycling sector.

The project representatives will participate in (e-)meetings, workshops and/or conferences relevant to the project.

The partners will also organize informative campaigns addressed to firms. In addition the project will prepare and distribute an informative brochure and a multimedia CDROM about the project.

Description: The consortium will make 3 workshops for the best communication and dissemination of the project. The timing of the workshops is connected with the project milestones (development of 5 indicative 3d scenarios, Mid Term evaluation results, End of the pilot implementation period).

Target group: The aim is to promote the training material and the platform to recyclers, local authorities, chambers, Associations, etc.

Result: 3 Workshops that will be organize in Greece, Austria and Czech Republic.

Area of application: WEEE REcycling and VET for "Green Professions"

Homepage:

Product Languages: English

## Product 'Content outline and Ontology'

Title: Content outline and Ontology

Product Type: teaching material

Marketing Text: The content describing the WEEE devices and their characteristic, plus additional material on the characteristics of recycling materials will be collected (different devices, variations, sources of updates) and categorized per WEEE type. An ontology will be built based on the collected content and with goal to be fully exploitable from the learning tools. Additionally up-to-date and trustworthy sources of information will be identified for the continuous update of the training courses.

Description: The partnership will perform collection of the existing material, analysis of the existing material, preparation (draft) of the topics (different devices, variations, sources of updates), to be included in the training scenarios. The training content will include at least the following topics:

- WEEE types
- Disassembly techniques
- Dangerous materials and substances
- WEEE parts management
- Handling of Plastic compounds
- Handling of Metallic compounds
- Packaging

The ontology will be built, based on the collected content and with goal to be fully exploitable from the learning tools.

Target group: WEEE industry Staff and VET Students in the relevant Sector

Result: Report

Area of application: WEEE Industry and Green Professions VET

Homepage:

Product Languages: Slovenian  
Czech  
English  
Greek  
Romanian  
French  
German

## Product 'Training material framework and specifications'

Title: Training material framework and specifications

Product Type: teaching material

Marketing Text: The report will describe the pedagogical framework resulting at outlining the training courses to be developed. The report will describe the specific requirements that the courses should follow, based on the selected content (task 3.1) and depicting the concept of "common ground" constructed through the cooperation of the partners. The task will deliver the framework for two courses:

- A course for low skilled employees working on the disassembly of EEE. The topics will cover skills to identify internal parts and safely disassembly and package the materials for recycling.
- A course for higher level personnel, decision makers in the WEEE industries. The topics the course will cover are what types of parts are included in the devices (plastic, metallic, etc) and how they can some identify them at first and their quality in a second stage.

Description: The task is to:

- to establish common ground regarding the training courses framework (content outline and pedagogies)
- to define the specifications that the development of the training material will follow
- to develop two training courses based on training scenarios and the ontology for the two target groups.

Target group: WEEE Industry Low skilled Technical Staff and Higher level personnel, VET Students

Result: Report

Area of application: WEEE Industry, Green Professions VET

Homepage:

Product Languages: English

## Product 'RECDEV 3D training platform'

Title: RECDEV 3D training platform

Product Type: website

Marketing Text: The product comprises the setting of the pilot platforms with all 50 training scenarios available in 7 languages (English, French, Greek, Slovenian, Czech, Austrian, Romanian).

Description: The activitie consists of the set-up the pilot platforms (one for each country with the 3D training scenarios uploaded) along with the required documentation and supporting material. The methodology will follow up toa degree the "Incremental Development Process Engineering (IDPE)"taking under consideration the basic principles of the Rational Unified Process. Its most important element is that the determination of the final solution is not covered totally in the beginning of the work package but is determined step by step through the development of prototypes that are used for the extraction of additional requirements.

Target group: WEEE Industry Staff of all levels as well as aspiring VET student in the relevant field of Green Professions

Result: Training Platform

Area of application: WEEE Industry and Green Professions VET

Homepage:

Product Languages: English  
Czech  
Greek  
Romanian  
French  
German  
Slovenian

## Events

### Kick off meeting

Date 24.10.2013

Description The first meeting since the beginning of the project, aiming at organizing all partners and setting the project as a priority for everyone.

Target audience To all partners of the project

Public Closed event

Contact Information Leonidas Somakos  
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Time and place Athens, Greece  
24/25-10-2013