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ee-WiSE Knowledge Transfer Framework Design

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Note:

This report is an extract of the full deliverable D4.2 Knowledge Transfer Framework Design. The content related to the specific analysis undertaken on the Knowledge Transfer Needs has been removed from this report to focus on the ICT tools analysis. Please go to deliverable D4.2 full version for the original report.

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1. INTRODUCTION

The first stage of the implementation phase in the ee-WiSE Project corresponds to WP4 [Figure 1]. The main objective of the Project is to develop a Knowledge Transfer Framework (KTF) within the value chain in the EE Sector for building retrofitting in the Mediterranean area, and with special attention to SMEs. The biggest outcome is the development of a validated tool of knowledge management and transfer, which will include guidelines for business models, market up-take, inter-sectorial cooperation, and certification and tendering. This deliverable is part of the first version of the final tool (Framework).

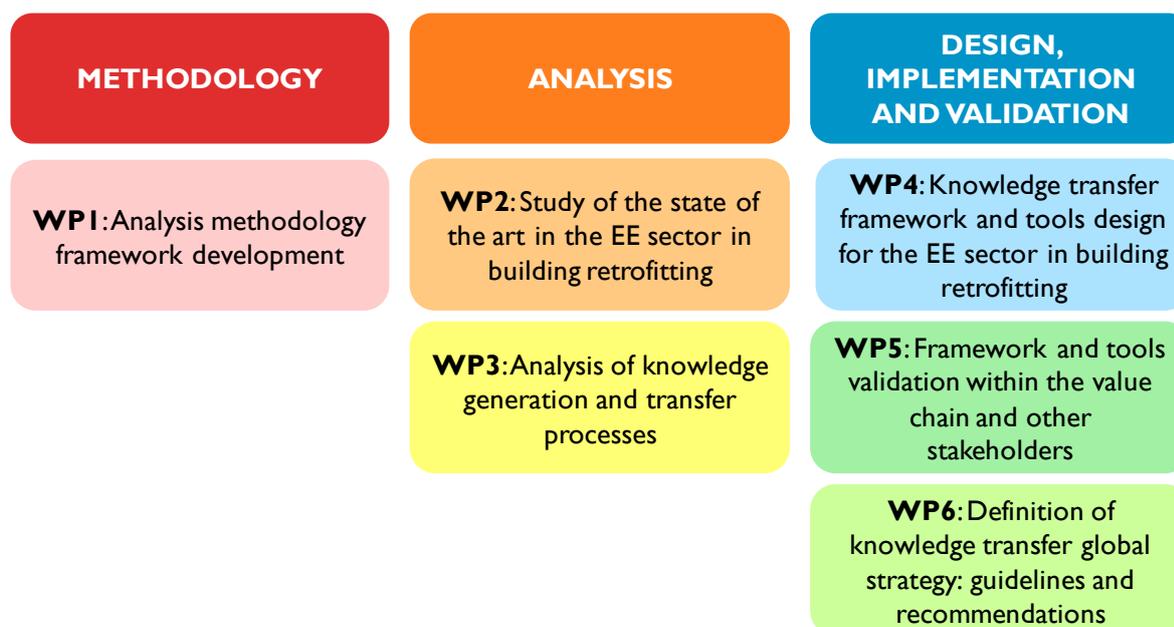


Figure 1: Technical Work Package overview

1.1. Field of application - Scope

WP4 is structured in 2 different parts which are represented by 2 different deliverables:

D4.1: Virtual Knowledge Transfer Tool

This deliverable contains the work carried out in Task 4.1 - the main objective of which is to materialize in ICT terms, the Framework containing the KT tools designed in D4.2.

- Task 4.1 Virtual Knowledge Transfer Tool Design (VKTT) - Task Leader AVACA

This report will describe the expected features and functions of the Knowledge Management (KM) tools, and a step by step plan that forms the basis for the elaboration of this instrument. The Plan will include a checking strategy that evaluates the accomplishment of the required features, and an enhancement plan for further improved versions which may be developed in subsequent months. The KM tools will entail the creation of a manual which describes the Tool's main objective, as well as a guidebook that shows the way it will work. Understandable texts are expected, whether final users are familiar with virtual technologies or not.

D4.2: ee-WiSE Knowledge Transfer Framework Design

This deliverable will explain the development and design of the different tools for Knowledge Transfer (KT) developed in Task 4.2, Task 4.3, Task 4.4, and Task 4.5 described below:

- Task 4.2: Designing of a battery of activities to produce general knowledge dissemination within the value chain - Task Leader X-PANEL
- Task 4.3: Designing of Training Tools to develop and Boost the EE market - Task Leader POSITIVE ENERGY
- Task 4.4: Designing of Inter-Agent activities that promote contact and knowledge generation (cooperation) Task Leader POSITIVE ENERGY
- Task 4.5: Designing of pilot experimental demonstrators activities to connect SMEs with existing R&D knowledge. Task Leader INTROMAC

This document is prepared as a conclusion of WP4, in order to impact positively on at least the following strategic issues:

- Addressing general knowledge needs of the value chain: activities for the knowledge dissemination.
- Improve value chain agents' capabilities, with special attention to SMEs: Training tools to develop and boost the EE market
- Encourage interaction between actors in the value chain to resolve KT problems: inter-agent activities that promote contact and knowledge generation
- Activities to encourage interaction between SMEs and R & D generators to improve get to-market of innovative solutions: Pilot Activities in experimental demonstrator buildings.

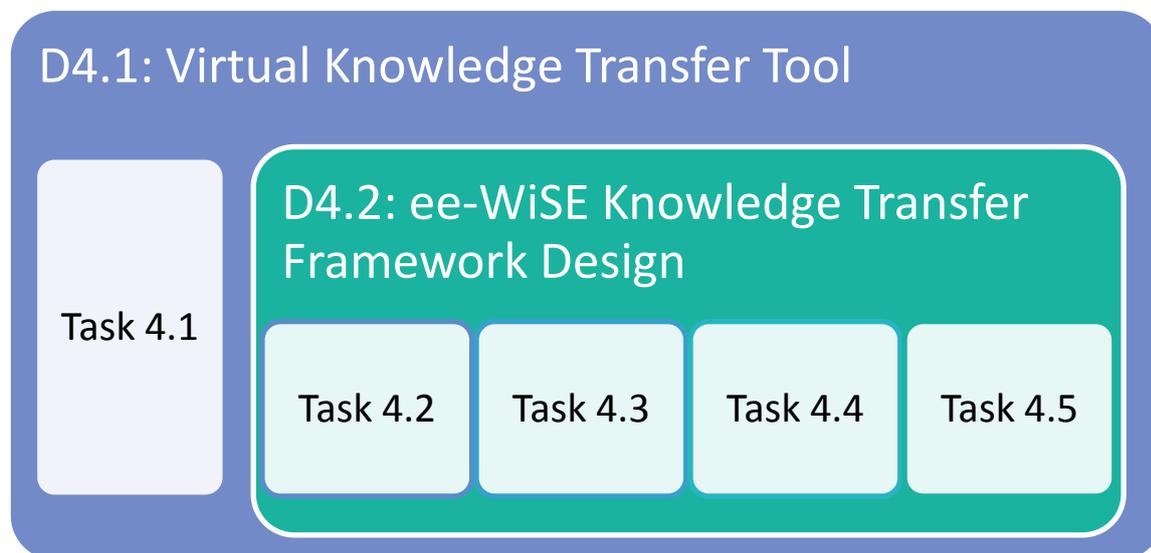


Figure 2: Internal functional basis of WP4 and its tasks.

1.2. ee-WiSE Knowledge Transfer Framework Design

Tasks 4.2, 4.3, 4.4, and 4.5 were designed to develop tools as solutions for KT needs. The Description of Work (DoW) document gives the following description for each one of the tasks:

- Task 4.2: Designing of a battery of activities to produce general knowledge dissemination within the value chain – Task Leader X-PANEL (Partner n°11)

Previously analyzed in WP3 Knowledge Management tools and techniques will be the basis of these activities, which are aimed to take place in the knowledge dissemination phase. These activities will lead to improve knowledge level of all agents involved, solving knowledge needs and gaps detected in previous analysis. Furthermore, designing a communication plan to society will be considered, in order to raise public awareness about the importance of energy efficiency in homes, defining society as an important player in the market. The base for these activities will be the VKTT previously designed in Task 4.1.

- Task 4.3: Designing of training tools to develop and boost the EE market – Task Leader POSITIVE ENERGY (Partner n°8)

Training tools in EE building retrofitting matters will be designed for different profiles, according to knowledge needs to develop market and paying special attention to SMEs as one main target. Moreover, agents will be able to collaborate between each other by consequently opportunities created. These activities will aim to raise knowledge level of SMEs in a practical way within the EE market.

- Task 4.4: Designing of inter-agent activities that promote contact and knowledge generation (co-creation) Task Leader POSITIVE ENERGY (Partner n°8)

Apart from previous activities designed, inter-agent processes will be taken into account. Active participation, complete attendance of players involved and knowledge generation activities enhancement are the main goals for the activities developed at this stage. The role of independent professionals who act as prescribers in the value chain (engineers, architects, etc.), as well as the administrative authorities and certification bodies will be pointed out in this task. Public and/or private financial agents will be considered in funding schemes activities.

- Task 4.5: Designing of pilot experimental demonstrators activities to connect SMEs with existing R&D knowledge – Task Leader INTROMAC (Partner n°1)

The demonstrated lack of relation between SMEs and R&D sources will be filled through these actions. Opportunities to test new developments or technologies using experimental demonstrator buildings will be designed, in order to enhance SMEs to deal with knowledge generated by researchers and encourage the commercial use of innovative energy efficiency measures or solutions. These activities will also focus on solving existing problems in the real application of EE models and solutions.

In this deliverable Tasks 4.2, 4.3, 4.4, and 4.5 are proposed using a horizontal approach implementing the same steps, but focusing on different subjects. Hence, each task addresses the development of a KT solution for a specific area of the EE Building Retrofitting sector:

TASK	TITLE	SUBJECT ADDRESSED
4.2	Designing of a battery of activities to produce general knowledge dissemination within the value chain	Tools to disseminate general EE retrofitting knowledge.
4.3	Designing of Training Tools to develop and Boost the EE market	Tools to boost the market.
4.4	Designing of Inter-Agent activities that promote contact and knowledge generation (cooperation)	Tools to promote professional contact and generate knowledge.
4.5	Designing of pilot experimental demonstrators activities to connect SMEs with existing R&D knowledge	Tools to exploit R&D findings.

Table 1: Subject addressed per task.

Once determined the scope of each task the field of action for each partner involved is clear. Deliverable 4.2 is built upon the same path each task undertakes as horizontal approach. The steps towards the Tools developed in the *ee-WiSE Knowledge Transfer framework Tools* deliverable have been the following:

1. CORRELATING WITH WP3: This is the previous step considered to analyze the needs found in WP3 and distribute them into the different tasks of WP4. [Section 2]
2. IDENTIFYING TOOLS FOR KNOWLEDGE TRANSFER NEEDS: The next step proposes KT activities as possible solutions for each KT need. [Section 3] – **Partly included in this report.**
3. ICT TRAINING TOOLS FOR LEARNING AND KNOWLEDGE SHARING: An ICT training tools research is undertaken in this step. As a result, the most suitable training tools are identified per need. [Section 4]
4. TOOLS FOR EFFECTIVE KNOWLEDGE TRANSFER: From the basis of a curriculum lesson plan, each KT need has been developed as a KT Tool considering the identified KT activities as solutions (step 2) and its most suitable ICT training tools (step 3). [Section 5] – **Not included in this report.**

The Knowledge Transfer Framework design approach based on training tools analysed in section 4 and section 5 of Deliverable 4.2 have a twofold approach - on one hand to become a valuable guide and be considered as a good practice to any organization or agent that intends to develop training engaging material, and on the other hand to present to the involved agents that have the required information, how to transform it into an effective and efficient framework. Furthermore it analyses theoretical structures for someone to gain the key competencies – knowledge, skills and attitudes - that are necessary for personal fulfilment, development, social inclusion, active citizenship and employment, so as to assist the selection of the proper mechanisms and thus incorporating them into the final output of the project. Finally, a set of guidelines, examples, tips and best practices are presented in order to assist the development of a learning process around new ICT means so as to promote effective knowledge transfer.

2. CORRELATING WITH WP3

Work Package 4 is following upon the foundations laid by Work Package 3. During WP3 a thorough study was performed and a set of Best Practices were presented as a result of the study of Knowledge Transfer Needs and identification of possible solutions.

In D3.1, the **needs** detected for effective knowledge transfer through the retrofitting value chain have been classified into groups, as shown in the following figure. Furthermore, these identified needs were also inserted into the questionnaire that was distributed to the value chain members in order for them to classify the importance of each need.



Figure 3: Needs for Knowledge Transfer

This classification was developed by ENERCYA in WP3, through a statistical analysis of questionnaires responses by several stakeholders in the EE sector and different countries in the Mediterranean area (Spain, Greece, Italy, Malta, Cyprus, Turkey and Bulgaria) taking into account the several countries that have participated and the type of agents of the value chain to identify the most important barriers to knowledge transfer. The information obtained from the questionnaires has been organized, studied and analyzed.

Secondly, a study of the three key criteria: frequency, potential and feasibility, was done and later the quantitative assessment of all barriers to knowledge transfer was developed.

The order of importance of all studied barriers to knowledge was concluded in a global ranking of the needs (represented in a chromatic scale) [Table 2] where is possible to identify the definitive importance of different barriers to knowledge transfer, that is, the segmentation and prioritization of the demand detected.

KNOWLEDGE TRANSFER NEED		TOTAL ASSESSMENT
A5	Training of construction professionals (including architects, civil engineers, building services engineers, project managers, building designers, etc) in retrofit technologies.	9,43
D3	Occupants need financial support to invest in EE retrofitting technology.	9,29
A1	Training of traditional craftsmen on EE retrofitting innovations.	9,10
D1	Increase business motivation through public R&D initiatives and innovation funding.	9,04
D2	Industry needs financial support to take up results of scientific innovation.	8,93
C4	When communicating research results, more focus needs to be given to practical benefits of the retrofit technology.	8,81
C2	Real-life evaluation of research results.	8,22
E2	Evaluation of publicly funded research projects via it's applicability to the end-user.	8,09
C1	Scientists need to have increased contact with the end-users in order to understand the applicability of their research.	7,74
A3	Training the business society to access the knowledge stock.	7,71
B1	Establishing network organisations that will coordinate knowledge transfer from innovation groups and assist in implementing innovation into daily building practice.	7,57
C3	R&D to divert their activity rapidly in response to changes in the market.	7,52
E1	EC guidelines for knowledge dissemination from the research institutions.	7,35
B2	Increased interaction amongst research institutions.	7,26
A4	The business society needs to be aware of tools to manage intellectual property.	7,10
B3	Clustering within the retrofit market to provide integrated solutions.	6,22
A2	Exposing the end users to the technological results of the research organizations.	5,97
B4	Connecting technical commercial advice to EPBD - energy performance and requirements of the actual buildings.	5,57

Table 2: Knowledge transfer needs ranking

2.1. Approach to Knowledge Transfer Tools

Needs and Solutions

Based on the extended analysis of needs and solutions for the Retrofitting value chain developed in D3.1, and in order to connect WP4 tasks with the needs and solutions studied before, a previous analysis of this relation is necessary. Hence, the following table shows a first identification of WP4 tasks with the specified needs while maintaining the priority order given in D3.1.

Matrix: Needs/ Agents/ Tasks		Agents involved directly						Type of knowledge	WP4 task
NEEDS		1. Public Bodies & Finance	2. Knowledge & Products Providers	3. Energy Providers	4. Energy & Retrofitting Services	5. Quality assurance	6. Demand		
A5	Training of construction professionals (including architects, civil engineers, building services engineers, project managers, building designers, etc) in retrofit technologies.	X	X		X			retrofit tech. training	4.4
D3	Occupants need financial support to invest in EE retrofitting technology.	X				X	X	financial	4.3
A1	Training of traditional craftsmen on EE retrofitting innovations.		X	X	X			innovation	4.5
D1	Increase business motivation through public R&D initiatives and innovation funding.	X	X	X	X		X	policies	4.4
D2	Industry needs financial support to take up results of scientific innovation.	X	X	X	X	X	X	financial	4.3
C4	When communicating research results, more focus needs to be given to practical benefits of the retrofit technology.	X	X	X	X		X	scientific	4.5
C2	Real-life evaluation of research results.	X	X		X	X	X	scientific	4.5
E2	Evaluation of publicly funded research projects via it's applicability to the end-user.	X	X				X	policies	4.4
C1	Scientists need to have increased contact with the end-users in order to understand the applicability of their research.	X	X				X	communication skills	4.5
A3	Training the business society to access the knowledge stock.	X	x	X	X			K. Management Training	4.4
B1	Establishing network organisations that will coordinate knowledge transfer from innovation groups and assist in implementing innovation into daily building practice.	X	X	X	X	X	X	cooperation for innovation	4.4
C3	R&D to divert their activity rapidly in response to changes in the market.	X	X		X		X	cooperation for innovation	4.4
E1	EC guidelines for knowledge dissemination from the research institutions.	X	X		X	X	X	dissemination for R&D projects	4.2
B2	Increased interaction amongst research institutions.	X	X					cooperation for innovation	4.4
A4	The business society needs to be aware of tools to manage intellectual property.	X	X			X		K sharing initiatives	4.3
B3	Clustering within the retrofit market to provide integrated solutions.	X	X	X	X		X	cooperation for integrated sol.	4.4
A2	Exposing the end users to the technological results of the research organizations.		x	X	X		X	dissemination to end-users	4.2
B4	Connecting technical commercial advice to EPBD - energy performance and requirements of the actual buildings.	X	X		X	X	X	integrated advise	4.2

Table 3: Matrix for KT Needs, agents and WP4 tasks, sorted in order of priority.

3. IDENTIFYING TOOLS FOR KNOWLEDGE TRANSFER NEEDS

This section aims to propose KT activities as possible solutions for each KT need. Each need will be analyzed within its assigned task hereafter. However, it is essential that each KT need determines the specific agents actively involved as *Receivers* and *Providers* of the KT activity. Hence a previous review over the Energy-Efficient Building Retrofitting value chain is incorporated below.

3.1. The Energy-Efficient Building Retrofitting value chain

The agents directly involved in the KT needs were defined in deliverables D1.1 and D2.1. The definition of the value chain was finalized with the agents and groups mentioned below [Figure 4, **¡Error! No se encuentra el origen de la referencia.**].

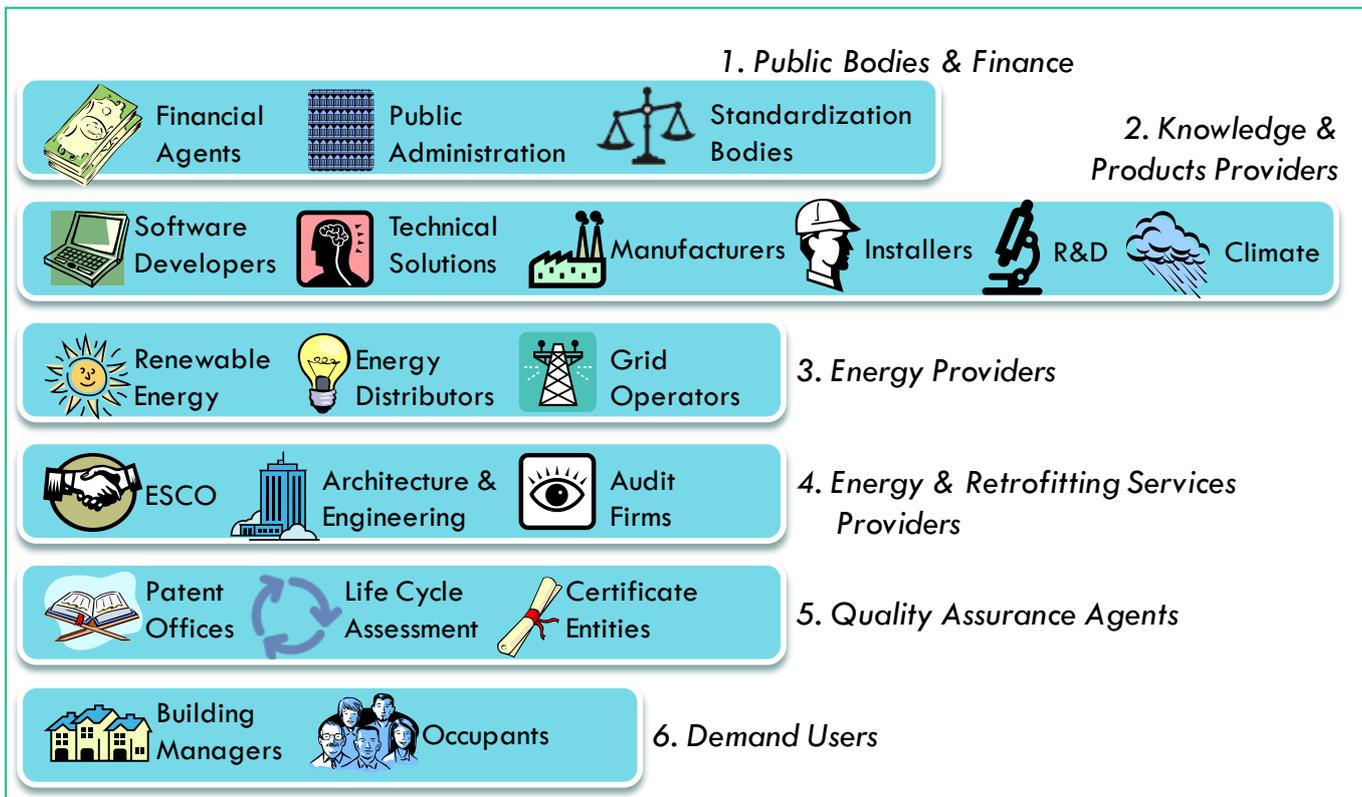


Figure 4: Energy Efficiency Retrofitting Sector's Value chain

The definition of each agent and group is specified as follows:

GROUP 1 - Public Bodies and Finance

This group is formed by the Enabling environment, i.e. infrastructure and policies, institutes and processes that shape the market environment.

- Public administration and authorities (ministries, municipalities, etc.) (PubA) classified as:
 - National authorities,
 - Regional authorities
 - Local authorities
- Standardization bodies (Standard)
- Banks, Financial Agents, Promoters, Subsidizers (Finance)

GROUP 2 - Knowledge and Products Providers

This group is formed by Knowledge and Products Providers:

- Technical solutions developers companies, (TechSol)
- Software developers (Software)
- R&D Institutes, Universities, (R&D)
- Meteorologists (Climate)
- Manufacturers of building elements, building materials (Manufacturer)
- Installers

GROUP 3 - Energy Providers

This group is formed by Energy Providers, from renewable energy companies and electric power transmission grid operators to energy distributors.

- Energy distributors (EDist)
- Renewable energy companies (RenewEn)
- Electric Power Transmission Grid Operators (GridOp)

GROUP 4 - Energy and Retrofitting Services Providers

This group is formed by Energy and Retrofitting Services Providers: Architecture and engineering companies, energy auditing firms and energy service companies.

- Architecture and Engineering Companies (A&E)
- Energy auditing firms (Audit)
- Energy Service Companies (ESCOs)

GROUP 5 - Quality assurance

This group is formed by actors in charge of the quality assurance: Certification bodies, intellectual property bodies and patent offices and life cycle assessment companies.

- Certification bodies (Certificate)
- Intellectual Property bodies and Patent offices (PO)
- Life cycle assessment companies (LCA).

GROUP 6 – Demand

- Homeowners and building users, occupants (Occupants)
- Real Estate agents, householders and building managers (BuildManage)

In order to identify the different tools that will help resolve the KT needs - questions 4 & 5 described in Section 2.2 *Steps to Develop an Effective Knowledge Transfer Framework* - have been explored to conduct an analysis of the best tool for each case. The following sections include this analysis per need, identifying the agents who act as *Receivers* and *Providers* in each case.

- RECEIVER: Agent of the value chain that participates in the KT activity by receiving specific knowledge from the Provider.
- PROVIDER: Agent of the value chain in charge of developing the knowledge that needs to be transferred to the Receivers.

4. ICT TRAINING TOOLS FOR LEARNING AND KNOWLEDGE SHARING

Bearing in mind the above analysis based on the previous Work packages of the ee-WiSE project and the work that needs to be carried out throughout the forth-coming work packages, the following pages attempt to provide a parameter to the scope of the project that will assist the consortium on obtaining a clear view of the environment for the further development of the work.

The Knowledge Transfer based on training tools approach analyzed on the following pages, aims to become a valuable guide and be considered as a good practice to any organization or agent that intends to develop training material engaging, interesting and attractive for a specific target group according to their needs and expectations, while at the same time valorizing the new information and communication technologies (ICT) available on the world wide web to be used for education and informational activities.

In addition, an approach is made towards the key competencies – knowledge, skills and attitudes- that are necessary for personal fulfilment, development, social inclusion, active citizenship and employment, so as to assist the selection of the proper mechanisms and thus incorporating them into the final output of the project.

Furthermore, having looked upon the environment, the target group, and the needs analysis undertaken from the members of the consortium, the partnership must proceed to the selection of tools and methods that will achieve the ICT tools and the innovative new methods. A view on the advantages, disadvantages, as well as the needs and opinions of the potential learners is made to meet the above mentioned necessity. For this reason, this section concludes with an indicative and not exhaustive presentation of a list of ICT tools that are innovative, effective, awarded and widely accepted in order to assist the development of a learning process around new ICT means so as to promote effective knowledge transfer. Extensive information of the following material can be found in the Annex of deliverable 4.1.

4.1. Methodological background for ICT training tools

- Training Material for the KT needs will be used.
- Training Modules will be designed to be used based on the needs of the target group.
- Profiles and Target groups will be defined
- What aspects of matrix they are addressing will be determined.

The training approach should describe the overall educational framework in which the training process is developed, also to meet the needs of the selected target group as those have been derived through the online survey which is conducted by the partnership (Info deriving from the Questionnaire Analysis).

Since the training tools will be based on the use of the new ICT technologies, this implies the use of interactive learning. Interactive learning means interaction with the resources, readings and information for most of the respondents of the online survey. Also for the respondents another important aspect of the learning process should be the interaction with the tutor / instructor / trainer / facilitator.

Also, the following assumptions should be included when designing training tools focused on the specific target group:

- ✓ Knowledge transfer (transforming knowledge into experiential knowledge) is most effective by small-group consultations and simulation
- ✓ In the course of assessing knowledge significant need appears for immediate feedback, this can be achieved by using online interactive tools and tests
- ✓ Serious consideration should be given to the use of video material in the learning process, since it is considered an extremely appealing tools when describing technical issues

Another parameter that the training tools should take into consideration is the *learning characteristics of the adult learners*. Adults:

- ✓ Prefer to acquire knowledge through experience (Hands-on-job Training, Learning by doing)
- ✓ Prefer to learn with e-tools that offer high level of interactivity
- ✓ Prefer the whole experience should be as user friendly as possible and additionally to attract them, having in mind the demanding working schedule.

A specified framework must be designed in order to assist in achieving the learning goals set that also takes into consideration the adult learning characteristics described above. To do so, certain aspects of training theory must be taken into account, such as carefully designed training activities the learners will perform, selection of teaching models to be used as guidelines for the learning process, what resources will be available to the participants of the learning experience, etc. A most known and widely used framework is the one suggested by Robert Gagne, which categorizes the whole approach in 3 main categories: Analysis, Design and finally Evaluation [Figure 5].

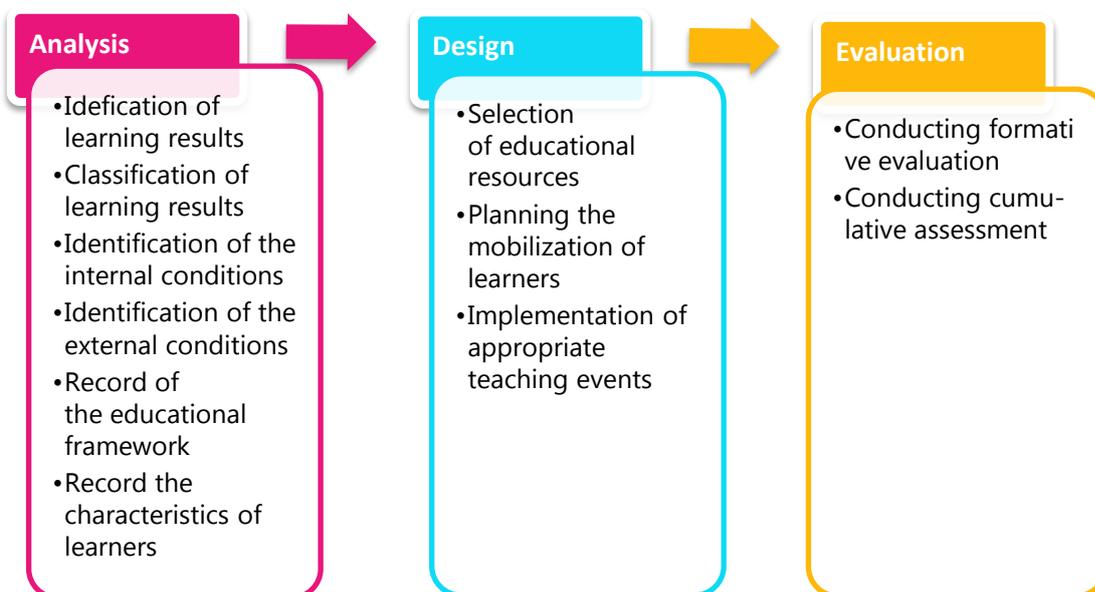


Figure 5: Robert Gagne's Instructional Design Model

Aiming to improve the engagement of learners which is the goal during the learning process, it is important to devote time, effort and thought to shape the environment and plan each class session/learning module taking into account the learning factor, information technology, personnel, general philosophy, educational schedule, etc with view to enhance the active participation of the learners whether in a classroom or through ICT tools.

4.1.1. Description of the Target group features

In order to properly define the learning goals of the training material, the special features of this target group have to be firstly identified. These features function as basic guidelines on how the learning objectives should be structured and thus developed accordingly. The features of the target group could be:

Cognitive features

In terms of cognitive features (knowledge) the adult learners have the following characteristics:

- ✓ Most likely they have basic knowledge of ICT literacy (how to turn on a PC, and navigate in the operating system and system folders)
- ✓ Their knowledge around sophisticated issues may vary
- ✓ The way they prefer to learn, varies
- ✓ The learners may have some knowledge of educational and social circumstances of the region they live in (due to their career choices)

Psychosocial features

Psychosocial features describe the socio-economical situation of a person as well as his / her beliefs, and the way of thinking. The adult learners have the following characteristics:

- ✓ The learners take part into a non-formal form of education
- ✓ The learners are precarious workers / part time workers / unemployed / entrepreneurs
- ✓ Their views about e-learning and technology in general, vary
- ✓ They are interested about cultural issues of the country they live in, as well as cultural issues and customs of other countries

Demographic features

When it comes to the demographics features analysis, the features that must be described are the mother language of the learner, her / his ethnic background, etc. In these terms the adult learners have the following characteristics:

- ✓ The way they prefer to learn, varies

Another parameter that needs to be include at the design phase of the training tools are the Key Competences and the learning objectives of each tool/ module.

4.1.2. Key Competences and learning objectives

Key competencies are not to be considered only for the young people, but for all ages and should be considered as well after the compulsory education and training, equipping them for working life, whilst forming a basis for further learning. Adults ought throughout their lives to indulge into a process of developing and updating their skills not only for business matters, but for their interpersonal development (lifelong learning). The training tools should be formed in such a way that the learners by the end of the learning process will have acquired those key competences that are needed in the labor market, in a way that is extremely appealing and interesting for them.

Key Competences

The acquisition of key competences fits in with the principles of equality and access for all. The EU reference framework also applies in particular to disadvantaged groups whose educational potential requires support. Examples of such groups include people with low basic skills, early school leavers, the long-term unemployed, people with disabilities, immigrants, elderly people, women who have left the professional field and re-enter after a long period, etc.

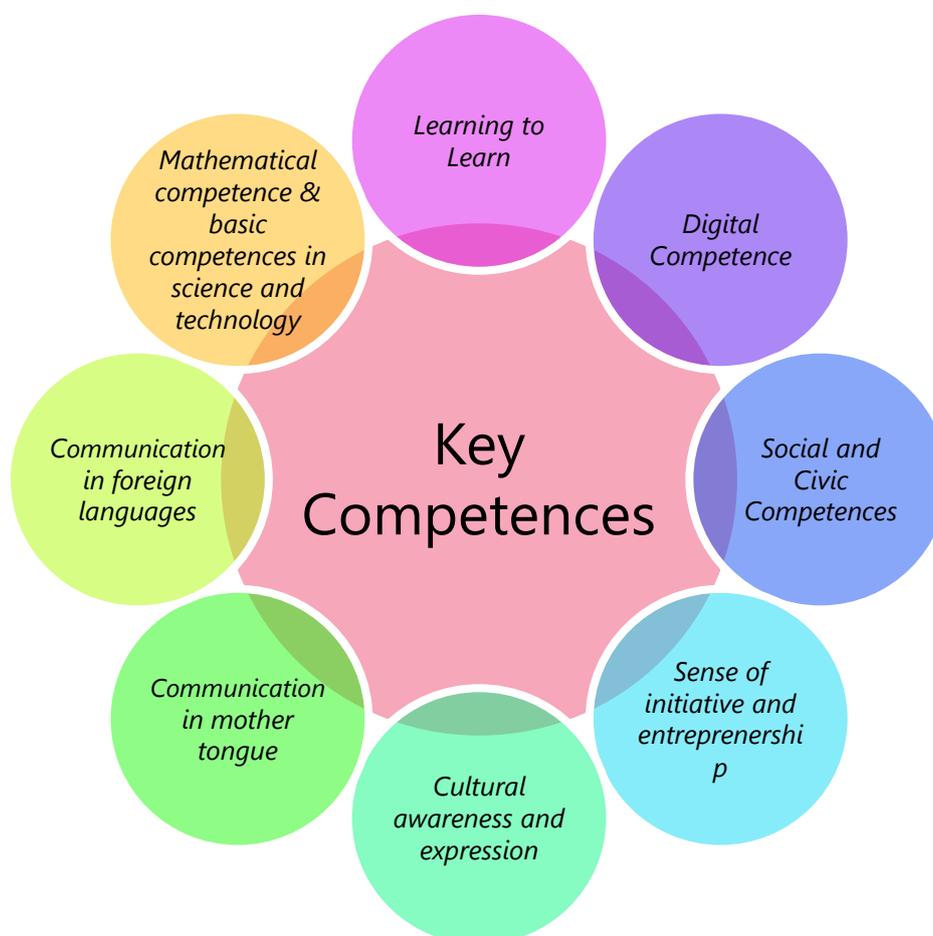


Figure 6: The 8 Key Competences

These key competences are all interdependent, and the emphasis in each case is on critical thinking, creativity, initiative, problem solving, risk assessment, decision taking and constructive management of feelings. These key competences provide a reference framework to support National and European efforts to achieve the objectives they define. This framework is mainly intended for policy makers, education and training providers, employers and learners. The status of the above stated Key Competencies is not obligatory, but rather is to be used as a reference by all EU Member States and their education and training organizations and actors in their effort to:

- ✓ Provide a basis for future learning: initial education and training offer all young people the means to develop the key competences to a level that equips them for adult and working life
- ✓ Offer the appropriate provision to young disadvantaged people in their training so that they can fulfil their educational potential
- ✓ Possibility to adults to develop and update their key competences throughout their lives, particularly priority target groups

- ✓ Provide the necessary infrastructure for continuing education and training of adults
- ✓ Ensure access to education and training and the labor market through suitable measures and that there is support for learners depending on their specific needs and competences
- ✓ Achieve coherence of adult education and training provision through close links between the policies concerned.

Learning Objectives Classification

As in every training exercise, in the proposed one as well, the results should be quantifiable, so to examine whether or not they have been achieved and consequently the necessary improvement actions to be undertaken. The most common and easy way is the segmentation of the whole course in learning objectives, which are located in three basic domains. Those three domains are: the cognitive, the affective and the psycho motor domain. The goals are described below, which the learners must achieve in those thematic sectors by the end of the training approach.

1. Learning objectives aimed at the Cognitive domain: In this segment the learning goals should be described in terms of mental skills (Knowledge).
2. Learning objectives aimed at the Affective domain: In this segment the learning goals should be described in relation to feelings or emotional areas (Attitude).
3. Learning objectives aimed at the Psychomotor domain: Lastly, in this segment the learning goals have to be described in terms of manual or physical skills (Skills).

4.2. Analysis of ICT tools with collaboration activities

- For each of the training tools what collaboration can exist
- If they do not allow collaboration why not and if they can be extended, how

4.2.1. ICT-based tools and methods used widely in learning approaches

This section approaches the various Information and Communication Technologies used in the learning process with different ways, but always to achieve the same goal. Each table describes and presents each one of the means, how it is used, presents the advantages and disadvantages and finally its correlation to the Key Competencies as they were recognised at EU level.

“Video in learning courses”

Title:	“Video in ICT learning courses”
Description	
	<p>Video can be used as a great compliment to almost all of ICT based learning courses. Some of the ways that video can be used in the courses are:</p> <ul style="list-style-type: none"> · Narration · Vignettes of experts providing advice/tips as it relates to the course’s content · Showing role-plays · Simulations, etc.

Advantages (+)	Disadvantages (-)
<ul style="list-style-type: none"> · Interesting · Direct approach · Engaging · Asynchronous e-learning · More concentrated knowledge · Requires low familiarity with ICT · Can offer simulation of real life experiences 	<ul style="list-style-type: none"> · Technical issues (different formats, size, etc) · Passive interaction · Requires stable internet connection · Requires extra time to be prepared · Requires extra time to set the learning material and content
Competencies acquired	
<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Digital Competence · Learning to Learn · Cultural awareness and expression 	
Required skills to develop video learning courses	Required knowledge to develop video learning courses
<ul style="list-style-type: none"> · <i>communication skills</i> to discuss the necessary processes, understand and follow instructions · <i>learning skills</i> to improve techniques for producing video art through practice and respond appropriately to requirements · <i>planning and organizing skills</i> to prepare and set up resources and work space · <i>self-management skills</i> to set own skill development goals 	<ul style="list-style-type: none"> · <i>technological background and competencies</i>, so as to efficiently select proper materials, tools and equipment commonly used for video art · knowledge of learning material and methods that shall be combined for the proper result · major styles of video art and the work of key practitioners relevant to individual area · intellectual property considerations for any person making creative work · ways of minimizing waste in the use of video art technologies
Required skills and competences to attend video learning courses	
<ul style="list-style-type: none"> · Familiarity with the tools and technology required · Ability to adjust to innovations · Efficient physical ability of seeing and hearing 	
Best Practices	
Videlectures.net, ocw.mit.edu	
Videos related to energy efficient retrofitting	
http://www.youtube.com/watch?v=GMW5Lrg9VmM http://www.youtube.com/watch?v=3bR9Derxxog http://www.youtube.com/watch?v=96WqrcK2OmM http://www.youtube.com/watch?v=EMdZr-TAga0 http://www.youtube.com/watch?v=bubzyD0tuol http://www.youtube.com/watch?v=XNCMwhYKdtM http://www.youtube.com/watch?v=Hkg-8H17sck	

“Simulation”

Title:	“Simulation”	
Description		
<p>A simulation in the learning process is a reproduction of an event / situation. Simulations can be produced in all fields through computer games, role-plays, or building models. Provides an immersive learning experience, is suitable for people with disabilities is suitable for all people with different cultural backgrounds.</p>		
Advantages (+)		Disadvantages (-)
<ul style="list-style-type: none"> · Cost effective · Friendly to trainer and trainee · Offers real life experiences · Fun · Trainee works at his/hers own pace · No programming skills required (plenty of available software) · Self-teaching through self-discovery · Easy soft skills training · Appealing · Can be used for people with disabilities 		<ul style="list-style-type: none"> · Time consuming · No social interaction (person to computer, instead of person to person)
Competencies acquired		
<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Digital Competence · Learning to Learn · Cultural awareness and expression · Social and civic competences · Sense of initiative and entrepreneurship 		
Required skills to develop simulation learning courses	Required knowledge to develop simulation learning courses	
<ul style="list-style-type: none"> · communication skills to efficiently understand and reproduce required processes · learning skills to continuously improve techniques for simulation processes and respond appropriately to feedback on own work · planning and organizing skills to prepare and set up resources and work space · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools and utilize all available features · deep knowledge of learning material and methods that shall be combined for the proper result · typical work space and equipment requirements for the production of courses · intellectual property considerations for any person making creative work 	
Required skills and competences to attend simulation learning courses		

<ul style="list-style-type: none"> · Familiarity with the tools and technology required · Ability to adjust to innovations
Best Practices OpenSimulator.org OpenWonderland.org Edusim3d.com OpenCobalt.org
Simulation related to energy efficient retrofitting http://apps1.eere.energy.gov/buildings/energyplus/

“Audio in learning”

Title:	“Audio in learning”	
Description	Audio in learning can be used in various forms (audio books, audio snippets, etc) and it makes it easy for example to take multiple books with wherever you go. Audio learning allows you to finally "read" all material wanted but never had the time for.	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> · Less expensive · Higher assimilation · Improvement of listening, speaking & comprehension skills · Increased interest · Mobility · Convenience · Increased spatial intelligence · Easily accessible 	<ul style="list-style-type: none"> · Poor & passive interaction skills · Lack of self-assessment of the learning process, with the exception of language learning · Low or no collaboration · Requires high degree of discipline
Competencies acquired	<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Digital Competence · Learning to Learn · Social and civic competences · Cultural awareness and expression 	
Required skills to develop audio-based learning courses	<ul style="list-style-type: none"> · great level of oral communication skills · learning skills to continuously improve techniques and utilize proper respond appropriately to feedback on own work · planning and organizing skills to prepare and set up resources and 	Required knowledge to develop audio-based learning courses
		<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools and utilize all available features · deep knowledge of learning material and methods that shall be combined for the proper result · typical work space and equipment

work space <ul style="list-style-type: none"> · self-management skills to set own skill development goals 	requirements for the production of courses <ul style="list-style-type: none"> · intellectual property considerations for any person making creative work
Required skills and competences to attend audio-based learning courses	
<ul style="list-style-type: none"> · Efficient physical ability of hearing · Familiarity with the tools and technology required 	
Best Practices	
Audacity.net	
Power Sound Editor	

“Podcasts” (audio lectures)

Title:	“Podcasts” - (audio lectures)	
Description	Same as the previous section.	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> · Portability – mobility · Convenience · Asynchronous learning · No extensive technical knowledge · Always available · More attractive than reading · Suitable for visually challenged people 	<ul style="list-style-type: none"> · Passive interaction skills · No image provision · Requires extra time to be properly produced
	Competencies acquired	
	<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Digital Competence · Learning to Learn · Social and civic competences · Cultural awareness and expression 	
	Required skills to develop podcasts	Required knowledge to develop podcasts
	<ul style="list-style-type: none"> · great level of oral communication skills · learning skills to continuously improve techniques and utilize proper respond appropriately to feedback on own work · planning and organizing skills to prepare and set up resources and work space · self-management skills to set own 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools and utilize all available features · deep knowledge of learning material and methods that shall be combined for the proper result · typical work space and equipment requirements for the production of courses

skill development goals	<ul style="list-style-type: none"> intellectual property considerations for any person making creative work
Required skills and competences to attend podcasts	
<ul style="list-style-type: none"> Efficient physical ability of hearing Familiarity with the tools and technology required 	
Best Practices	
Juice Receiver	
Podcast Generator	
Podcasts related to energy efficient retrofitting	
https://itunes.apple.com/cy/podcast/hph039-planning-phased-retrofit/id548674350?i=224483719&mt=2 https://itunes.apple.com/cy/podcast/u.k.-green-investment-bank/id351439388?i=131112192&mt=2 https://itunes.apple.com/cy/podcast/new-business-opportunities/id274303095?i=229740856&mt=2 https://itunes.apple.com/cy/podcast/link-between-dsm-wind-energy/id274303095?i=62213156&mt=2	

“e-learning courses” (synchronous, asynchronous)

Title:	“e-learning courses” - (synchronous, asynchronous)	
Description	<p>e-learning described in a short phrase is a continuum of learning processes and practices enhanced by Information and Communication Technologies (ICT), in order to improve the quality of learning”.</p> <p>Synchronous Learning In the Synchronous Learning the trainee participates in real time learning via an intranet or the Internet.</p> <p>Asynchronous Learning In Asynchronous training the trainer can prepare the educational materials and store it to an electronic medium (LCMS/LMS), while afterwards the learner can take the learning material anywhere and at any time he / she chooses to.</p> <p>Blended Learning Finally, the term Blended learning describes the learning model of learning which implements both asynchronous communication technologies and conventional education structures. In this model of learning, learners usually begin the education process at conventional educational structures and then access content and communicate with the trainer using Internet technologies.</p>	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> Asynchronous learning Convenience Cost effective Increased availability of educational opportunities No commuting Self-paced knowledge 	<ul style="list-style-type: none"> Self-discipline Basic ICT literacy Internet access and equipment Not suitable for all science subjects (e.g. nursing clinicals) Social isolation

<ul style="list-style-type: none"> · Personalized education material · Synchronized and updated information · Increased collaboration between instructor and learners · Less intimidating – risk free environment · Learn while working · Ongoing access to resources · Increased retention · Easily managed 	
Competencies acquired	
<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Mathematical competence and basic competences in science and technology · Digital Competence · Learning to Learn 	
Required skills to develop asynchronous learning courses	Required knowledge to develop asynchronous learning courses
<ul style="list-style-type: none"> · communication skills to efficiently reproduce educative processes through technological means · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools and utilize all available features · deep knowledge of learning material and methods that shall be combined for the proper result · typical work space and equipment requirements for the production of courses · intellectual property considerations for any person making creative work
Required skills and competences to attend asynchronous learning courses	
<ul style="list-style-type: none"> · Efficient web access through internet or intranet · Familiarity with the tools and technology required 	
Best Practices	
Moodle.org	

Mobile learning (mlearning)

Title:	"Mobile learning" (mlearning)	
Description	<p>The term mLearning, or "mobile learning" covers: learning with portable technologies including but not limited to handheld computers, MP3 players, notebooks, tablets and mobile phones. mlearning focuses on the mobility of the learner, interacting with portable technologies, and learning that reflects a focus on how society and its institutions can accommodate and support an increasingly mobile population.</p>	
Advantages (+)	Disadvantages (-)	
<ul style="list-style-type: none"> · Portable – mobility · Immediate application of knowledge · No commuting · Convenience · Support of rich media (when necessary) · Easy access to expertise · Interaction · Synchronized and updated information · Engaging · Quick access to resources · Addictive · New trend with increased human resources to its development 	<ul style="list-style-type: none"> · Fragmented learning experience – distractions · Lack of self-assessment of the learning process (at this point) · Usability (small screens, access to internet connection) · Expensive equipment (smartphones, tablets, goggles, etc) · Protection and security issues (personal data) · High ICT literacy – adaptability · Increased cost & effort for proper educational material 	
Competencies acquired		
<ul style="list-style-type: none"> · Digital Competence · Learning to Learn 		
Required skills to use mobile learning	Required knowledge to use mobile learning	
<ul style="list-style-type: none"> · communication skills to efficiently reproduce educative processes through mobile technologies · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools and utilize all available features · deep knowledge of learning material and methods that shall be combined for the proper result · typical work space and equipment requirements for the production of courses · intellectual property considerations for any person making creative work 	
Required skills and competences to attend mobile learning		
<ul style="list-style-type: none"> · Efficient web access through internet or intranet · Familiarity with the tools and technology required 		

Best Practices

mole-project

“Educational Games”

Title:	“Educational Games”	
Description	Educational games are games that have been designed and created to teach people about a certain subject, expand concepts, reinforce development, understand a historical event or culture, or assist them in learning a skill (competence) as they play.	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> · Engaging to all ages · Promote teamwork & cooperative creative endeavor · Practice problem-solving skills, creative thinking & cognitive processing · Encourage cooperative & competitive behavior · Increase short and long-term memory · Relaxing · Preparation for the real world (too expensive to reproduce in classroom) · Knowledge remains 	<ul style="list-style-type: none"> · Social isolation · Addictive · Poor social interaction skills · Retain learning in favor of finishing the game · Expensive to produce
	Competencies acquired	
	<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Mathematical competence and basic competences in science and technology · Digital Competence · Learning to Learn · Cultural awareness and expression 	
	Required skills to develop Educational Games	Required knowledge to develop Educational Games
	<ul style="list-style-type: none"> · good level of creativity and imagination, in order to efficiently reproduce educative processes through gaming technologies · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development and utilize all available features · deep knowledge of learning material and methods that shall be combined with gaming techniques for the proper result · typical work space and equipment requirements for the production of courses

<ul style="list-style-type: none"> self-management skills to set own skill development goals 	<ul style="list-style-type: none"> intellectual property considerations for any person making creative work
Required skills and competences to attend Educational Games	
<ul style="list-style-type: none"> Familiarity with the tools and technology required Adjustment to innovations 	
Best Practices	
Scratch	
Educational Games related to energy efficient retrofitting	
http://www.ngridenergyworld.com/eew/	

“Augmented Reality applications & software, Virtual Reality worlds”

Title:	"Augmented Reality applications & software", "Virtual Reality worlds"	
Description	<p>Augmented Reality (AR) is a term for a live direct or indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. The technology functions by enhancing one's current perception of reality.</p> <p>Virtual reality (VR) is a term that applies to computer-simulated environments that can simulate physical presence in places in the real world, as well as in imaginary worlds. Most current virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special stereoscopic displays, but some simulations include additional sensory information, such as sound through speakers or headphones.</p>	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> Engaging to all ages Addictive Practice problem-solving skills, creative thinking & cognitive processing Knowledge remains Increase short and long-term memory Preparation for the real world (too expensive to reproduce in classroom) Highly interesting environment 	<ul style="list-style-type: none"> Increased cost & effort for proper educational material Digital literacy Expensive equipment
	Competencies acquired	
	<ul style="list-style-type: none"> Communication in the mother tongue Communication in foreign languages Digital Competence Learning to Learn Social and civic competences Cultural awareness and expression 	

Required skills to develop Augmented Reality applications & software, Virtual Reality worlds	Required knowledge to develop Augmented Reality applications & software, Virtual Reality worlds
<ul style="list-style-type: none"> · good level of creativity and imagination, in order to efficiently reproduce educative processes through real-world environments · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development and utilize all available features · deep knowledge of learning material and methods that shall be combined with real – world simulation techniques for the proper result · typical work space and equipment requirements for the production of courses · intellectual property considerations for any person making creative work
Required skills and competences to attend Augmented Reality applications & software, Virtual Reality worlds	
<ul style="list-style-type: none"> · Familiarity with the tools and technology required · Adjustment to innovations 	
Best Practices	
OpenSGToolbox	

“Communication Tools”

Title:	“Communication tools”	
Description	Communication tools can be considered as every tool, software, application etc that provides direct audio or/and video connection between the trainers and the trainees, in addition, the same tools can offer communication between the group of trainees for collaborative sessions.	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> · Less expensive · Direct · Improvement of listening, speaking & comprehension skills · Convenience · No extensive technical knowledge · Suitable for visually challenged people · Personalised · Increased collaboration between instructor and learners · Risk free environment · Interaction 	<ul style="list-style-type: none"> · Requires one trainer per trainee · Increased time for the trainer compared to classes ·

<ul style="list-style-type: none"> · Encourage cooperative behavior 	
Competencies acquired	
<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Digital Competence · Social and civic competences 	
Required skills to develop courses based on Communication tools	Required knowledge to develop courses based on Communication tools
<ul style="list-style-type: none"> · good level of oral and writing communication skills · ability to adjust and correspond immediately · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development and utilize all available features · deep knowledge of learning material and methods that shall be combined with real – time communication tools · typical work space and equipment requirements for the production of courses
Required skills and competences to attend courses based on Communication tools	
<ul style="list-style-type: none"> · Efficient web access through internet or intranet · Familiarity with the tools and technology required · Good ability to cooperate 	
Best Practices	
Openmeetings	

“Blog-based learning, social networking sites, community portals”

Title:	“Blog-based learning”, “social networking sites”, “community portals”
Description	<p>Blogs, social networking sites and community portals all have in common one thing: they are all available online.</p> <p>Blogs are websites that host frequent posts and can be of any subject, the material included is mostly text, audio, video, presentations, etc and are very easy to navigate through.</p> <p>A social network is a social structure made up of individuals (or organizations) called “nodes”, which are tied (connected) by one or more specific types of interdependency, such as friendship, kinship, common interest, financial exchange, dislike, sexual relationships, or relationships of beliefs, knowledge or prestige.</p> <p>Community portal or links page is a web site that functions as a point of access to information in the World Wide Web. A portal presents information from diverse sources in a</p>

unified way. Apart from the standard search engine feature, web portals offer other services such as e-mail, news, stock prices, information, databases and entertainment.	
Advantages (+)	Disadvantages (-)
<ul style="list-style-type: none"> · Asynchronous · Convenience · Cost effective · Self-paced knowledge · Personalized education material · Updated information · Ongoing access to resources 	<ul style="list-style-type: none"> · Basic ICT literacy · Internet access and equipment · Social isolation · indirect
Competencies acquired	
<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Digital Competence · Learning to Learn · Social and civic competences 	
Required skills to develop courses based on “Blog-based learning”, “social networking sites”, “community portals”	Required knowledge to develop courses based on “Blog-based learning”, “social networking sites”, “community portals”
<ul style="list-style-type: none"> · good level of writing communication skills · ability to adjust and correspond to in multicultural ways · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development and utilize all available features · deep knowledge of learning material and methods that shall be combined with social networking communication tools · typical work space and equipment requirements for the production of courses
Required skills and competences to attend courses based on “Blog-based learning”, “social networking sites”, “community portals”	
<ul style="list-style-type: none"> · Efficient web access through internet or intranet · Familiarity with the tools and technology required · Good ability to cooperate · Proper social behaviour 	
Best Practices	
WordPress	
Blogs and articles related to energy efficient retrofitting	
http://www.washingtonpost.com/blogs/wonkblog/wp/2013/02/13/u-s-homes-are-getting-more-efficient-but-still-use-just-as-much-energy/ http://energy.gov/articles/energy-saver-101-infographic-home-heating http://www.energyefficiencymatters.org/#	

“Wiki Tools”

Title:	“Wiki Tools”	
Description	<p>A wiki is a website that allows the creation and editing of any number of interlinked web pages via a web browser using a simplified markup language or a WYSIWYG text editor. Wiki tools have a great way of assisting the learning experience and overall offer a solid support towards the ones that chose to use them.</p>	
Advantages (+)	Disadvantages (-)	
<ul style="list-style-type: none"> · Anyone can edit · Easy to use and learn · Wikis are instantaneous so there is no need to wait for a publisher to create a new edition or update information · People located in different parts of the world can work on the same document · The wiki software keeps track of every edit made and it's a simple process to revert back to a previous version of an article · Widens access to the power of web publishing to non-technical users · The wiki has no predetermined structure - consequently it is a flexible tool which can be used for a wide range of applications · There are a wide range of open source software wiki's to choose from so licensing costs shouldn't be a barrier to installing an institutional wiki 	<ul style="list-style-type: none"> · Anyone can edit so this may be too open for some applications, for example confidential documentation. However it is possible to regulate user access · Open to SPAM if not managed properly · Requires Internet connectivity to collaborate · The flexibility of a wiki's structure can mean that information becomes disorganized · The usual guidelines for healthy computer use apply 	
Competencies acquired		
<ul style="list-style-type: none"> · Digital Competence · Learning to Learn · Cultural awareness and expression 		
Required skills to develop courses based on Wiki Tools	Required knowledge to develop courses based on Wiki Tools	
<ul style="list-style-type: none"> · good level of writing communication skills · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development and utilize all available features · deep knowledge of learning material and methods that shall be combined with cooperative tools · intellectual property considerations 	

<ul style="list-style-type: none"> · results in good time · self-management skills to set own skill development goals 	for any person making creative work
Required skills and competences to attend courses based on Wiki Tools	
<ul style="list-style-type: none"> · Efficient web access through internet or intranet · Familiarity with the tools and technology required · Good ability to cooperate · Proper social behaviour 	
Best Practices	
Qwiki.com etherpad.com	
Wikis related to energy efficient retrofitting	
http://en.wikipedia.org/wiki/Passive_solar_heating http://en.wikipedia.org/wiki/Heat_pump http://en.wikipedia.org/wiki/Green_building	

“Mind mapping”

Title:	“Mind mapping”	
Description	<p>Concept mapping or also called mind mapping software is used to create diagrams of relationships between concepts, ideas or other pieces of information. It has been suggested that the mind mapping technique can improve learning / study efficiency up to 15% over conventional note taking.</p>	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> · Generates more ideas · Make new connections · Improves memory · Make use of the whole brain · Stores more information · Can incorporate additional documents (links, files, etc) · Rearrange order are appropriate with least effort · Creativity · Innovation · Changing ways of work 	<ul style="list-style-type: none"> · Not applicable to all · Time consuming (at first stages) · Not easy to pass to someone else who was not present at the design of the mind map
Competencies acquired		
<ul style="list-style-type: none"> · Learning to Learn 		
Required skills to develop courses based on Mind mapping	Required knowledge to develop courses based on Mind mapping	
<ul style="list-style-type: none"> · learning skills to continuously improve techniques and combine them appropriately 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development 	

<ul style="list-style-type: none"> · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · and utilize all available features · deep knowledge of learning material and suitable mind mapping methods that shall be combined to achieve proper results · intellectual property considerations for any person making creative work
Required skills and competences to attend courses based on Mind mapping	
<ul style="list-style-type: none"> · Familiarity with the tools and technology required · Good ability to cooperate 	
Best Practices	
Mindmeister	
Mind mapping related to energy efficient retrofitting	
http://www.mindmapart.com/energy-saving-mind-map-jane-genovese/	

“Webinars, web meetings, online conferences”

Title:	“Webinars, web meetings, online conferences”	
Description	The term Web conferencing / Webinar refers to a service that allows conferencing events, meetings, workshops, etc to be shared with remote locations. Most vendors also provide either a recorded copy of the event, or a means for a subscriber to record the event.	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> · full audiovisual & action features · real-time interactivity · no commuting · cost effectiveness · flexibility · convenient · participation 	<ul style="list-style-type: none"> · computer literacy
	Competencies acquired	
	<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Learning to Learn · Social and civic competences 	
	Required skills to develop courses based on online conferences	Required knowledge to develop courses based on online conferences
	<ul style="list-style-type: none"> · good level of oral and writing communication skills · ability to adjust and correspond immediately · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development and utilize all available features · deep knowledge of learning material and methods that shall be combined with online tools · intellectual property considerations

prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals	for any person making creative work
Required skills and competences to attend courses based on online conferences	
· Efficient web access through internet or intranet · Familiarity with the tools and technology required · Good ability to cooperate · Proper social behavior	
Best Practices	
Free Web Meeting	
BigBlueButton	
Webinars related to energy efficient retrofitting	
http://www1.eere.energy.gov/buildings/webinar_archives.html	

“e-book”

Title:	“e-book”	
Description	An electronic book (also e-book, ebook, electronic book, digital book) is a book-length publication in digital form, consisting of text, images, or both, and produced on, published through, and readable on computers or other electronic devices.	
	Advantages (+)	Disadvantages (-)
	<ul style="list-style-type: none"> · Delivered instantaneously · No commuting · E-books take up less space, need no space to store · Portable · Can be accessed anywhere · Can be stored and carried from one place to another more safely · Include links for easy access to more information and related websites · Searchable · Multimedia: e-books can be interactive and contain audio, video and animations · E-books are printable · Fonts can be resized · With specific software it is possible to turn some of the e-books into audio books · It is very simple and easy to purchase and download an e-book. People living in big modernized cities, in a remote village in a far away country or on a small island, can 	<ul style="list-style-type: none"> · Little computer literacy is required · Can be lost if not backed up (hard drive failure) · E-book readers cost money · Eyestrain · Not all the books are available in ebook format

equally access an e-book. <ul style="list-style-type: none"> It is possible to purchase an e-book 24/7/365, from anywhere 	
Competencies acquired	
<ul style="list-style-type: none"> Digital Competence Learning to Learn 	
Required skills to develop e-books	Required knowledge to develop e-books
<ul style="list-style-type: none"> good level of writing communication skills learning skills to continuously improve techniques and combine them appropriately planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time self-management skills to set own skill development goals 	<ul style="list-style-type: none"> technological background and competencies, so as to efficiently select proper tools for development and utilize all available features deep knowledge of learning material and methods that shall be adjusted to create ebook intellectual property considerations for any person making creative work
Required skills and competences to attend courses based on e-books	
<ul style="list-style-type: none"> Efficient web access through internet or intranet Familiarity with the tools and technology required Efficient physical ability 	
Best Practices	
Sigil	
E-books related to energy efficient retrofitting	
http://www.ngridenergyworld.com/efficiency/t_book.html http://www.ngridenergyworld.com/environment/t_book.html http://www.bounceenergy.com/docs/ebook-diy-energyefficiency.pdf http://books.google.com.cy/books?id=OfiMKyFV8JIC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false	

"Online forums"

Title:	"Online forums"
Description	An online forum (or message board), is an online discussion website where people can hold conversations in the form of posted messages. The difference from a chat room is in that messages are at least temporarily archived.
Advantages (+)	Disadvantages (-)
<ul style="list-style-type: none"> Always available Handle same questions once Information source Intellectual exchange Enhances cooperation and communication 	<ul style="list-style-type: none"> Certain familiarity with the forum setup, computer literacy Reduced concentration and focus Reduced productivity Chronic procrastination Being distracted by endless debates

<ul style="list-style-type: none"> · Contribution of many people with better results · Builds relationships between visitors · No scheduling problems or interruptions · Each person can participate at the time that suits them · Hold concurrent conversations · People can participate in multiple conversations at the same time · Meet in larger groups · By breaking into sub-groups, large groups can easily meet online · In-built record-keeping 	<p>& idle gossip</p> <ul style="list-style-type: none"> · Impaired social skills, neglected relationships, and a weakened social circle (a consequence of substituting online socialization for face-to-face conversations) · Lack of real-time interface · Forum management is time consuming · Requires high participation in order to be efficient and meaningful · Contribution comments are sometimes with poorer language
Competencies acquired	
<ul style="list-style-type: none"> · Communication in the mother tongue · Communication in foreign languages · Mathematical competence and basic competences in science and technology · Learning to Learn · Social and civic competences 	
Required skills to develop courses based on online forums	Required knowledge to develop courses based on online forums
<ul style="list-style-type: none"> · good level of oral and writing communication skills · ability to adjust and correspond immediately · learning skills to continuously improve techniques and combine them appropriately · planning and organizing skills to prepare and set up resources and work space so as to achieve proper results in good time · self-management skills to set own skill development goals 	<ul style="list-style-type: none"> · technological background and competencies, so as to efficiently select proper tools for development and utilize all available features · deep knowledge of learning material and methods that shall be combined with online tools · intellectual property considerations for any person making creative work
Required skills and competences to attend courses based on online forums	
<ul style="list-style-type: none"> · Efficient web access through internet or intranet · Familiarity with the tools and technology required · Good ability to cooperate · Proper social behaviour 	
Best Practices	
phpbb bbpress	
Forums related to energy efficient retrofitting	
http://www.greenbiz.com/blog/2012/12/04/policy-and-incentives-drive-energy-efficiency-retrofits	

The following diagram shows the different ICT interactive-training tools that the learner can use, divided in categories and giving examples for each.

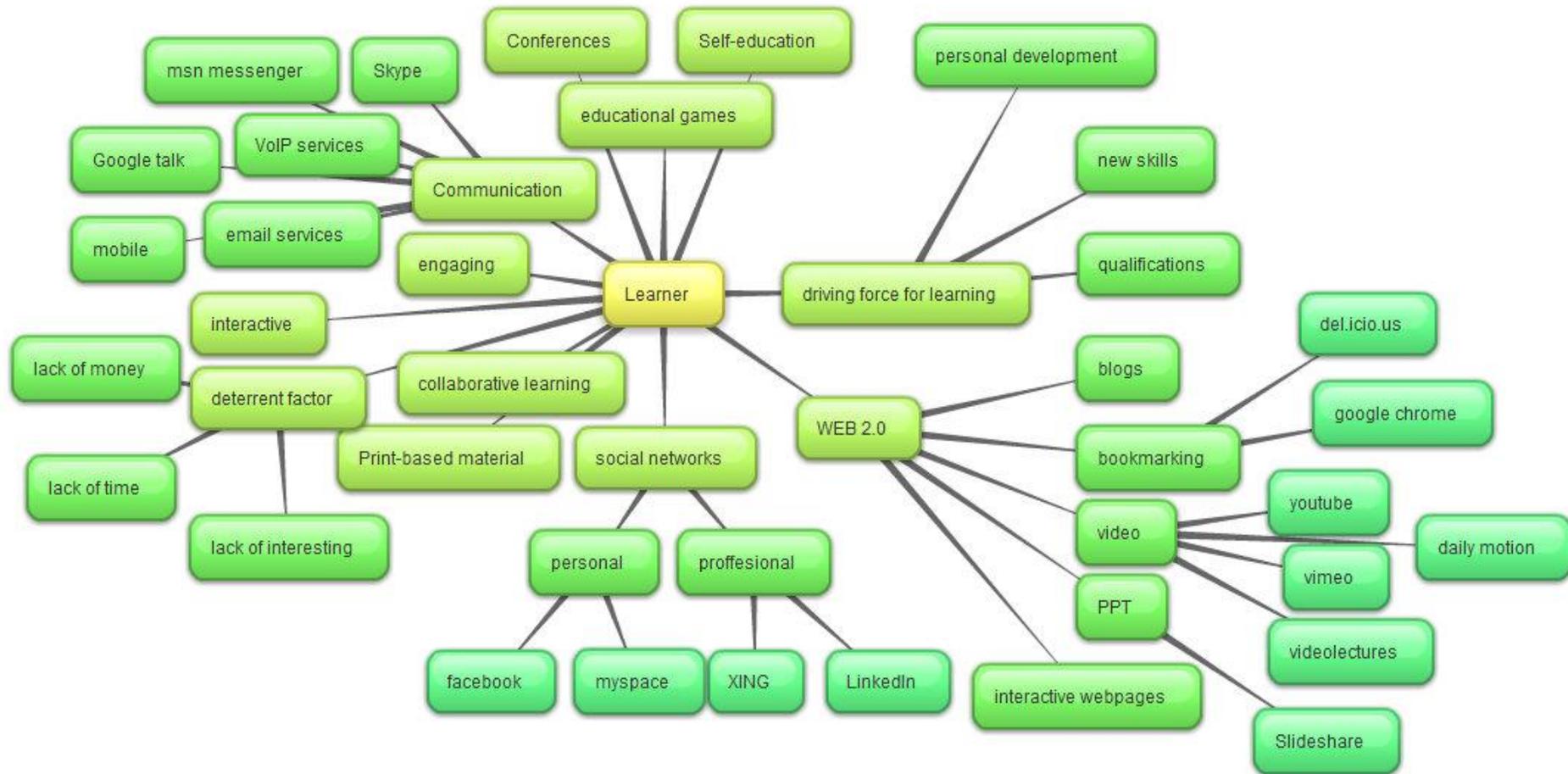


Figure 7: Diagram: ICT interactions relative to learning

4.1. Selection of ICT training tools

After identifying the previous ICT training tools, it was decided amongst the ee-WiSE partners which tools were more suitable for each knowledge transfer need. For this, each partner provided his/her preferred tool from the point of view of specific agents, playing the role of “Receiver” (R) or “Provider” (P) depending on the need. The answers were compiled in 2 matrices presenting the votes of each ICT training tool per need and per agent (Figure 6 & **¡Error! No se encuentra el origen de la referencia.**)

MOST VOTED TOOLS PER NEED			“Video in learning courses”	“Simulation”	“Audio in learning”	“Podcasts” (audio lectures)	“e-learning courses” (synchronous, asynchronous)	Mobile learning (mlearning)	“Educational Games”	“Augmented Reality applications & software, Virtual	“Communication Tools”	“Blog-based learning, social networking sites, community portals”	“Wiki Tools”	“Mind mapping”	“Webinars, web meetings, online conferences”	“e-book”	“Online forums”
Task 4.2	E1	R		1		1	1				1				1		
		P	1	4		3	4				8	5	1		6	6	5
	A2	R	2		1	1	1		1		4	3	1		3	2	2
		P	2	6		2			3	4		2			3	1	
	B4	R				4	2		1		1	1	1	2	1	2	2
		P	1	2		1	1	2	2	1	3	3	1	1	5	1	3

Table 4: Piece of matrix results per need

MOST VOTED TOOLS PER AGENT			“Video in learning courses”	“Simulation”	“Audio in learning”	“Podcasts” (audio lectures)	“e-learning courses” (synchronous, asynchronous)	Mobile learning (mlearning)	“Educational Games”	“Augmented Reality applications & software, Virtual	“Communication Tools”	“Blog-based learning, social networking sites, community portals”	“Wiki Tools”	“Mind mapping”	“Webinars, web meetings, online conferences”	“e-book”	“Online forums”
Knowledge & Products Providers	Technical Solutions	R					4		2	1	4	3	1	1	3	1	5
		P	5	2	1	2	6	1	4	2	6	5	2	1	7	6	5
	Manufacturers	R									1				1		
		P	2	3		1		2	1	2	2	1	2	2	4	1	3
	Installers	R	4	1		1	2	1	1		2		2	1	3	5	1
		P	1	2		2	1		1			2			2	1	3
	R&D	R	2	2		1	6	1		1	5	3		1	2	1	2
		P	4	11		1	5	1	1	4	9	5	2		8	2	7

Table 5: Piece of matrix results per agent

Each one of these matrices was summarized in a final table exposing the 3 “most voted” ICT training tools, and an additional one distinguishing answers from receivers and providers in each case. The tables below show these ranking results. The results out of this matrices will be employed in the functioning of the Framework itself, such as the favourite tools per agent, per agent as receiver/ provider, etc.

MOST VOTED TOOLS PER NEED			Ranking Results per Need			Ranking Results (Receiver/ Provider)			
			1°	2°	3°	1°	2°	3°	
Task 4.2	E1	EC guidelines for knowledge dissemination from the research institutions.	R	Communication Tools	Webinars, web meetings, online conferences	e-book	Communication Tools	Webinars, web meetings. online	e-learning courses (synchronous.
	A2	Exposing the end users to the technological results of the research organizations.	R	Webinars, web meetings, online conferences	Simulation	Blog-based learning, social networking sites, community	Communication Tools	Webinars, web meetings. online	Blog-based learning, social networkina sites.
Task 4.3	B4	Connecting technical commercial advice to EPBD - energy performance and requirements of the actual buildings.	R	Webinars, web meetings, online conferences	Online forums	Podcasts (audio lectures)	Podcasts (audio lectures)	Online forums	Mind mapping
							Webinars, web meetings. online	Online forums	Blog-based learning, social networkina sites.
	D3	Occupants need financial support to invest in EE retrofitting technology.	R	Communication Tools	Webinars, web meetings, online conferences	Video in learning courses	Communication Tools	Webinars, web meetings. online	Video in learning courses
Task 4.3	D2	Industry needs financial support to take up results of scientific innovation.	R	Webinars, web meetings, online conferences	Communication Tools	Blog-based learning, social networking sites, community	Webinars, web meetings. online	Blog-based learning, social networkina sites.	Communication Tools
							Communication Tools	Online forums	Webinars, web meetings. online
	A4	The business society needs to be aware of tools to manage intellectual property.	R	Blog-based learning, social networking sites, community	Webinars, web meetings, online conferences	Mobile learning (mlearning)	Blog-based learning, social networkina sites.	Webinars, web meetings. online	Mobile learning (mlearning)
Task 4.3	A5	Training of construction professionals (including architects, civil engineers, building services engineers, project managers, building designers, etc) in retrofit	R	Webinars, web meetings, online conferences	Simulation	e-learning courses (synchronous, asynchronous)	Webinars, web meetings. online	Simulation	e-learning courses (synchronous.
							Simulation	Webinars, web meetings. online	Educational Games
	D1	Increase business motivation through public R&D initiatives and innovation funding.	R	Webinars, web meetings, online conferences	Communication Tools	Video in learning courses	Webinars, web meetings. online	Communication Tools	Video in learning courses
Task 4.3	E2	Evaluation of publicly funded research projects via it's applicability to the end-user.	R	Blog-based learning, social networking sites, community	Online forums	Simulation	Webinars, web meetings. online	Communication Tools	Augmented Reality applications & software.
							Online forums	Blog-based learning, social networkina sites.	Webinars, web meetings. online
							Simulation	Blog-based learning, social networkina sites.	Podcasts (audio lectures)

Task 4.4	A3	Training the business society to access the knowledge stock.	R P	Webinars, web meetings, online conferences	Educational Games	Video in learning courses	Webinars, web meetings, online	Video in learning courses	Educational Games
	B1	Establishing network organisations that will coordinate knowledge transfer from innovation groups and assist in implementing innovation into	R P	Online forums	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community	Webinars, web meetings, online	Online forums	Blog-based learning, social networking sites.
	C3	R&D to divert their activity rapidly in response to changes in the market.	R P	Blog-based learning, social networking sites, community	Webinars, web meetings, online conferences	Video in learning courses	Blog-based learning, social networking sites.	Webinars, web meetings, online	Video in learning courses
	B2	Increased interaction amongst research institutions.	R P	Online forums	Communication Tools	Webinars, web meetings, online conferences	Webinars, web meetings, online	Online forums	e-learning courses (synchronous). Blog-based learning, social networking sites.
	B3	Clustering within the retrofit market to provide integrated solutions.	R P	Video in learning courses	Webinars, web meetings, online conferences	Online forums	Webinars, web meetings, online	Blog-based learning, social networking sites.	Video in learning courses
Task 4.5	A1	Training of traditional craftsmen on EE retrofitting innovations.	R P	Simulation	Video in learning courses	e-book	Simulation	Video in learning courses	Webinars, web meetings, online
	C4	When communicating research results, more focus needs to be given to practical benefits of the retrofit technology.	R P	Online forums	e-learning courses (synchronous, asynchronous)	Blog-based learning, social networking sites, community	Online forums	Blog-based learning, social networking sites.	Video in learning courses
	C2	Real-life evaluation of research results.	R P	Communication Tools	Blog-based learning, social networking sites, community	Webinars, web meetings, online conferences	Communication Tools	Blog-based learning, social networking sites.	Online forums
	C1	Scientists need to have increased contact with the end-users in order to understand the applicability of their research.	R P	Webinars, web meetings, online conferences	Online forums	Communication Tools	Communication Tools	Online forums	Blog-based learning, social networking sites.
							Blog-based learning, social networking sites.	Webinars, web meetings, online	Online forums

Table 6: Ranking results per need and role

MOST VOTED TOOLS PER AGENT			Ranking Results per Agent			Ranking Results (Receiver/ Provider)		
			1 ^o	2 ^o	3 ^o	1 ^o	2 ^o	3 ^o
Public Bodies & Finance	Financial Agents	R	Podcasts (audio lectures)	Blog-based learning, social networking sites, community portals	Online forums	Podcasts (audio lectures)	Blog-based learning, social networking sites, community	Online forums
		P						Podcasts (audio lectures)
	Public Admin.	R	Blog-based learning, social networking sites, community portals	Podcasts (audio lectures)	Webinars, web meetings, online conferences	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community	Online forums
		P				Podcasts (audio lectures)		Podcasts (audio lectures)
GOV	R	Podcasts (audio lectures)	Blog-based learning, social networking sites, community portals	Online forums	Podcasts (audio lectures)	Blog-based learning, social networking sites, community	Online forums	
	P				Podcasts (audio lectures)		Simulation	Educational Games
Standarization	R	Blog-based learning, social networking sites, community portals	Podcasts (audio lectures)	Webinars, web meetings, online conferences	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community	Online forums	
	P				Podcasts (audio lectures)		Podcasts (audio lectures)	Communication Tools
Knowledge & Products Providers	Software Developers	R	Online forums	e-learning courses"(synchronous, asynchronous)	Communication Tools	Online forums	e-learning courses"(synchronous, asynchronous)	Communication Tools
		P				Webinars, web meetings, online conferences	e-learning courses"(synchronous, asynchronous)	Communication Tools
	Technical Solutions	R	Online forums	e-learning courses"(synchronous, asynchronous)	Communication Tools	Online forums	e-learning courses"(synchronous, asynchronous)	Communication Tools
		P				Webinars, web meetings, online conferences		e-learning courses"(synchronous, asynchronous)
	Manufacturers	R	Webinars, web meetings, online conferences	Communication Tools	Online forums	Webinars, web meetings, online conferences	Communication Tools	Video in learning courses
		P				Webinars, web meetings, online conferences		Online forums
	Installers	R	e-book	Webinars, web meetings, online conferences	Video in learning courses	e-book	Video in learning courses	Webinars, web meetings, online conferences
		P				Online forums		Webinars, web meetings, online conferences
R&D	R	Communication Tools	Simulation	e-learning courses"(synchronous, asynchronous)	e-learning courses"(synchronous, asynchronous)	Communication Tools	Wiki tools	
	P				Simulation		Communication Tools	Online forums
Climate	R	Communication Tools	Simulation	e-learning courses"(synchronous, asynchronous)	e-learning courses"(synchronous, asynchronous)	Communication Tools	Wiki tools	
	P				Simulation		Communication Tools	Online forums

Energy Providers	Renewable Energy	R P	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community portals	e-learning courses"(synchronous, asynchronous)	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community	e-learning courses"(synchronous, asynchronous)
	Energy Distributors	R P	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community portals	e-learning courses"(synchronous, asynchronous)	Webinars, web meetings, online conferences	Communication Tools	Podcasts (audio lectures)
	Grid Operators	R P	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community portals	e-learning courses"(synchronous, asynchronous)	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community	e-learning courses"(synchronous, asynchronous)
Energy & Retrofitting Services	ESCO	R P	Webinars, web meetings, online conferences	Communication Tools	Simulation	Webinars, web meetings, online conferences	Communication Tools	Simulation
	Architect. & Engineer.	R P	Webinars, web meetings, online conferences	Simulation	Video in learning courses	Webinars, web meetings, online conferences	Simulation	e-book
	Audit Firms	R P	Webinars, web meetings, online conferences	Communication Tools	Simulation	Webinars, web meetings, online conferences	Simulation	Video in learning courses
Quality assurance	Patent Offices	R P	Online forums	Webinars, web meetings, online conferences	Communication Tools	Webinars, web meetings, online conferences	Online forums	Mobile learning (mlearning)
	Life Cycle Assessment	R P	Online forums	Webinars, web meetings, online conferences	Communication Tools	Webinars, web meetings, online conferences	Online forums	Blog-based learning, social networking sites, community
	Certificate entities	R P	Online forums	Webinars, web meetings, online conferences	Communication Tools	Webinars, web meetings, online conferences	Mind mapping	Mobile learning (mlearning)
Demand	Building Managers	R P	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Online forums	Webinars, web meetings, online conferences	Online forums	Communication Tools
	Occupants	R P	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Online forums	Webinars, web meetings, online conferences	Online forums	Mobile learning (mlearning)

Table 7: Ranking results per agent and role

