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Deliverable 6.4 – Recommendations and Guidelines for Knowledge Transfer Regarding Standardization, Public Procurement and Certification:

Practical procedures, Recommendations and Guidelines Report

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Authors: Álvaro Pastor

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1. INTRODUCTION

The ee-WiSE Project has been approved in the 2012 FP7 call, within the Theme: Methodologies for Knowledge Transfer within the Value Chain and particularly on SMEs and consists of an international consortium of 13 partners including research institutes, companies (also SMEs), universities and public entities from 7 different countries in the Mediterranean area. The main purpose of the ee-WiSE project was to develop a Framework for Knowledge Management and Transfer within the EE building retrofitting value chain in the Mediterranean, and with special attention to SMEs. The project has been designed to achieve three main goals:

1) to reach the European Energy Efficiency (EE) targets,
2) to promote the building retrofitting sector, and
3) to foster knowledge transfer within agents of the value chain.

The present deliverable is expected to provide a framework of practical procedures, recommendations and guidelines underlining knowledge transfer within the value chain and particularly for SMEs. For this reason it presents the current situation regarding energy efficiency, describes the aims and goals of the ee-WiSE project in this context, and proposes a specific methodological approach for knowledge management and transfer within the EE building retrofitting value chain in the Mediterranean.

1.1. Field of application - Scope

Figure 1 Mediterranean basin

This document's key goal is to stimulate retrofit market activities that move beyond traditional public awareness campaigns, program maintenance, demonstration projects, and other "one-time" strategies and projects. Specifically, this deliverable seeks to fill the gap in knowledge transfer activities and investments that are prevalent in the retrofitting market in ways which can fundamentally and permanently transform energy markets in the Mediterranean region in a way that make retrofitting and energy efficiency the options of first choice, together with establishing a self-sustaining retrofit market. This document is designed to overcome one of the major barriers to adoption of potential retrofitting measures by providing access to information, and access to skilled workers. This is expected

to enable retrofit companies and other complementary industries to increase their capacity to serve the Mediterranean markets better, while providing the necessary economies of scale and market competition that can drive down the cost of products/services and establish a more sustainable retrofit market. So while the field of application is focused primarily towards Mediterranean organisations involved in the retrofitting market, the majority of issues raised and addressed also have relevance to the rest of the European market.

1.2. The ee-WiSE: A tool for knowledge transfer improvement across the value chain

The Energy Efficiency sector is expected to experience momentum through an increase in the retrofitting activity since rehabilitation of the existing building stock can provide more energy efficiency opportunities compared to that of new buildings[1]. The existing buildings' energy impact must be reduced in order to reduce the final CO2 emissions resulting from the buildings' energy consumption. Unfortunately the Energy Efficient Retrofitting knowledge generated over the years by the value chain agents involved has not been managed correctly and consequently knowledge transfer actions are practically inexistent. There are a small number of identified processes currently active throughout the Mediterranean countries that boost Knowledge Transfer in order to promote the EE sector[2]. In a real scenario, the knowledge generated in the EE sector should result in added benefits across the value chain[3]. This turns out to be the main problem of the EE sector: knowledge transfer is not effective between the different agents of the value chain. Therefore the questions that need to be answered are:

- Why do the knowledge and policies applicability not flow to all Value Chain Agents?
- Why do most companies operating in the field of building retrofitting ignore such policies, and even worse, do not respond to the demand from users in terms of improving energy efficiency in their homes?

It is vital to determine where the system failures or weakness in the KT are, that prevent existing knowledge, both from a technical and an economic-social point of view, to come to the companies so these can take the important role they deserve to encourage energy efficiency improvements in buildings.

The main objective of ee-WiSE is to develop a Framework for Knowledge Management and Knowledge Transfer within the energy efficient building retrofitting value chain with special attention to SMEs in the Mediterranean Area. ee-WiSE has identified, through a complex methodology, the critical points of this knowledge transfer (**KT**) flows, in order to act on its breakpoints. The combination of a phase of analytical work and another of Knowledge Transfer Framework design and validation will provide the industry with a valuable tool to help improve the EE market. The main output of the project is the creation of a Knowledge Transfer Tool that introduces a Knowledge Transfer methodology focused on building retrofitting within the value chain, to enhance the Energy Efficiency's Market in the Mediterranean area. The main advantages of the Knowledge Transfer Framework are:

[1] http://www.economistinsights.com/sites/default/files/downloads/EIU_GBPN_EnergyEfficiency_120921r3.pdf
[2] http://energies2050.org/wp-content/uploads/2014/03/2014-03-14-Final-Agenda_Round-Table_Johnson-Controls.pdf
[3] http://www.ener2i.eu/related_projects/r2i_cluster_mediterranean

- It improves the knowledge flow throughout the Value Chain, thus ensuring that the companies participate in sharing and usage of the current research knowledge, providing a solution to what the user requires through designers and prescribers.
- Moreover, it enhances the value of tested functional and cost-effective construction solutions/materials already offered by producers.
- It offers a tool for the different administrations that can be used to coordinate the development of regulations in their competence levels and control mechanisms of compliance with uniform and objective criteria.
- By including certification bodies, this project takes into consideration an agent that just validates building companies' accomplishment in terms of energy efficiency to the administration authorities, financial institutions and of course the end user.

1.3. The Approach

The methodology developed for carrying out the ee-WiSE project followed a logical progression in which each specific objective was tackled within a work package (WP) of works.

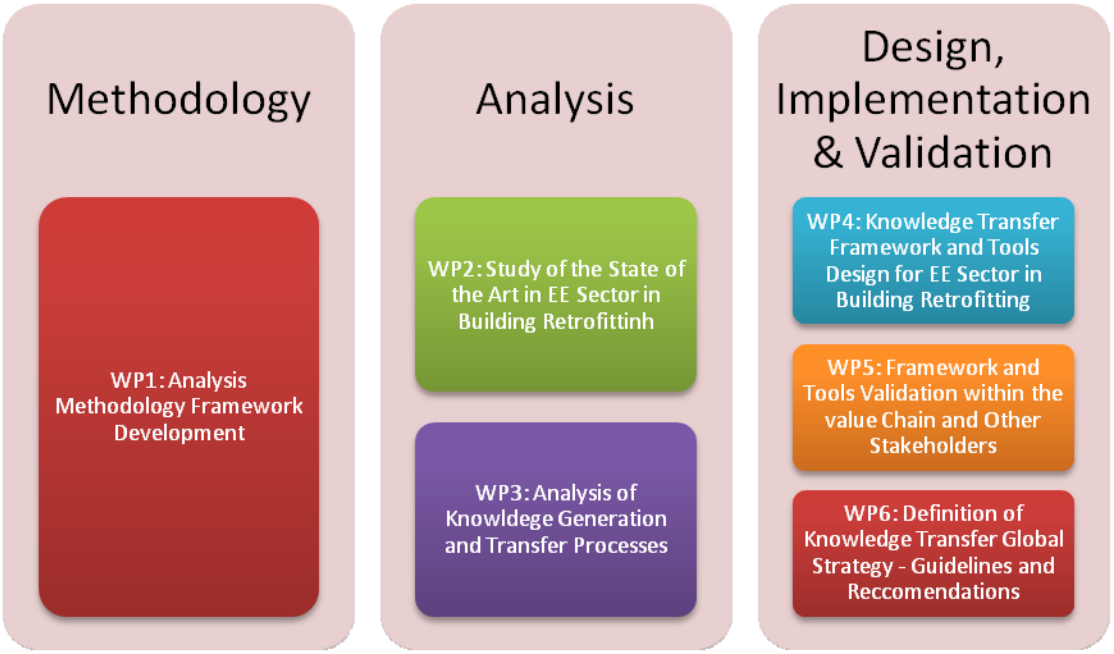

Figure 2 The ee-WiSE project stages

More in detail:

- **<u>Work package 1: Analysis Methodology Framework Development</u>**

The goals of this WP were to identify a solid methodology for determining the most effective procedures for conceptualizing the items that will be studied; a set of optimal tools for undertaking the analysis of each designed concept, and a methodological frame which constituted an integrated tool containing all the data captured during the analysis phase. The main deliverable of the specific Work Package was a Methodological framework with tools for data collection of relevant information, providing a systematic set of procedures for the scientific and technical coordination and management

of the project. Additionally, it included the description of the value chain, as well as the related concepts with respect to the value chain and energy efficiency in a Mediterranean climate.

- **Work package 2: Study of the state of the art in the EE sector in building retrofitting**

The goals of this WP were: a) compilation and study of current situation in knowledge transfer processes and practices in the EE sector in building retrofitting with special attention to aspects concerning SMEs and b) an identification of current underlying knowledge transfer processes, between agents of the value chain, detecting existing gaps. WP2 yielded two deliverables: a State-of-the-Art Base Report and a Knowledge Transfer Flows Analysis Report. The State of the Art Base Report of the current situation provided evidence on the global status of Knowledge in the EE sector and the Knowledge Transfer Processes Analysis report showed through a Knowledge Transfer Flows Map its real state and its breakpoints, including a SWOT analysis.

- **Work package 3: Analysis of knowledge generation and transfer processes**

The main goal of this WP was to determine the framework conditions and specific support agents required in order to successfully activate the sector. In addition, the most important needs and barriers hindering or enabling knowledge transfer were identified for each individual value chain group, by means of a consultation process that involved the value chain agents themselves and that produced a ranked list of knowledge transfer needs. The main deliverable was a Knowledge Generation and Transfer Processes Report that identified the major stumbling blocks and required solutions to overcome the lack of knowledge transfer flow in the retrofitting value chain, and also included a detailed inventory of best practices.

- **Work Package 4: Knowledge Transfer Framework and Tools Design for EE Sector in Building Retrofitting**

The goals of this WP were a) to establish a solid methodology as a way to find the best procedures to conceptualize the items that will be studied, b) to design optimal tools to undertake the analysis of each designed concept, c) to develop a methodological frame which will be able to create an integrated tool that stores all the data captured during the analysis phase and finally, to ensure the active participation of all stakeholders providing the project co-creative capacity. The above goals have been fulfilled through two main deliverables, D4.1 ee-Wise KTF Design and D4.2 Virtual Knowledge Transfer Tool Description. Task 4.1 dealt with the design and implementation of the KT platform. The design took into consideration the material designed in Deliverable 4.2 together with a web platform for allowing users to upload content as providers and search and view content as receivers.

- **Work Package 5: Framework and Tools Validation within the value Chain and Other Stakeholders**

The main goal of WP5 was to get feedback from the representatives of the value chain through an iterative workshop process which validated the adequacy of the knowledge transfer framework and knowledge management tools developed in the previous WPs. A Framework and Knowledge Management Tools Validation Plan was developed (Deliverable 5.1) to set out the methodology, planning and monitoring of the validation activities. The Knowledge Transfer Framework, Knowledge Transfer Guidelines and ICT tools developed in WP4 were validated using a two-level approach, where the validation actions were implemented on a country level, as well as on a consortium level. During the primary validation phase, the developed KTF, guidelines and Tools were presented to the target audience – agents of the value chain – in workshops in each of the partner countries. The regional workshops were followed by the consortium-level workshop, aimed to validate the developed knowledge transfer framework. The results of the validation actions were used to develop the Validation report and conclusions, which was the second deliverable of Work Package 5. The Report included an Enhancement Plan with a number of recommendations for improvement of the Knowledge Transfer Tool (KTF). Most recommendations were implemented before the end of WP5 and a new

improved version of the KTF was released.

WP6 "Definition of the Knowledge Transfer Global Strategy: Guidelines and Recommendations" was based on:

a) On the theoretical know-how gained from WP2 and WP3,

b) On the development of KT Framework and KT Tool developed WP4 and

c) On the practical based evidences obtained through WP5 validation experiences.

The objectives of work package 6 were:

- Define a set of Knowledge Transfer Processes regarding the main milestones in Knowledge management, according to the sector's needs and the situation deriving from previous WPs, to enhance contact and communication between agents of the value chain and develop their intellectual capital for productive knowledge sharing and usage.
- Based on the study and analysis of best practices and evidence gathered through validation activities "Recommendations and Guidelines will be developed for the sector".
- Uptake of tacit knowledge implicit within the Sector's value chain.

1.3.1. The Deliverables

Work Package 6 deliverables are:

- D6.1: Business Models: Practical procedures, recommendations and Guidelines Report
- D6.2: Promoting Market up-taking measures: Practical procedures, recommendations and Guidelines Report
- D6.3: Enhancing Cross-Sectorial Cooperation: Practical procedures, recommendations and Guidelines Report
- D6.4: Standardization, Public Procurement and Certification: Practical procedures, recommendations and Guidelines Report

Each of those deliverables answers:

a) Knowledge Generation: How to generate new knowledge
b) Knowledge Sharing: How to effectively share this knowledge
c) Knowledge Dissemination: How to disseminate and use the knowledge with maximal effect

The four deliverables address these issues from the perspective of all agents with special attention to:

A. policy recommendations concerning the promotion and support for sustainable business models
B. successful development of multi-skilled SMEs' partnerships

Analysis of the Deliverables

- **D6.1: Business Models: Practical procedures, recommendations and Guidelines Report**

Definition: "A business model" describes the method or means by which the different value chain agents will transform the knowledge gathered into creating a profitable business. Business models are an essential part of strategy formation – they provide the fundamental link between product markets within the industry, and the markets for the factors of production. A business model may be based on many different aspects of the accumulated knowledge while concentrating on value creation.

- **D6.2: Promoting Market uptake measures: Practical procedures, recommendations and Guidelines Report**

Definition: "Market Up-Take" is the rate or extent to which EE Retrofit technologies are implemented in a country or region. A successful market up-take depends on how well the building owners and building managers respond to the retrofit technologies showcased to them. It involves a change in the society's behaviour and readiness to learn about and implement new technologies into their everyday life.

- **D6.3: Enhancing Cross-Sectorial Cooperation: Practical procedures, recommendations and Guidelines Report**

Definition: Cross-sectorial cooperation as applied to the EE retrofitting sector is the interaction between the professional agents of the value chain that are involved in technical and innovative developments. A good cooperation amongst agents will lead to an effective knowledge sharing, dissemination or generation, and thus a promotion of the competitiveness of the sector.

- **D6.4: Standardization, Public Procurement and Certification: Practical procedures, recommendations and Guidelines Report**

Definition: "standardization, public procurement and certification" are the processes that Public Bodies are directly involved in within the energy retrofitting sector. These agents range from Administration and Regulation Organisms, to Certifying Entities being responsible for the development of the legal framework and the creation of other type of requirements which can affect the market.

1.4. Difference between Deliverables 6.1 – 6.2 – 6.3 – 6.4

Practical Procedures, Guidelines and Recommendations for...			
Business Models (D.6.1) Identifies the opportunities and obstacles existing in the process of knowledge transfer within the retrofitting market and provides a step by step guide on how to create business models for the examined sector.	**Promoting Market Up-take (D.6.2)** Identifies the best ways to bring the EE Retrofit technologies and relevant knowledge to the market via strategic communication and methods to effectively increase knowledge transfer flows between the value chain agents.	**Enhancing Cross-Sectorial Cooperation (D.6.3)** Identifies the best cooperation strategies to overcome knowledge transfer gaps between the value chain agents and foster the sector's development and innovation, as a result of this interaction.	**Standardization, Public Procurement and Certification (D.6.4)** Deals with the processes that Public Bodies are directly involved within the EE retrofitting sector. These agents are from Administration and Regulation Organisms to Certifying Entities as the responsible of the development of the legal framework and the creation of other type of requirements which can affect the market. Knowledge and ideas generation, knowledge sharing and knowledge dissemination and use involve different agents of the Value Chain.

2. METHODOLOGICAL APPROACH

2.1. Agents Definition

In the first phase of ee-WiSE, a full analysis of the EE Retrofitting Sector Value Chain was undertaken in order to ensure a full and complete common understanding of the issues at hand. The value chain key players are classified in the chart below according to their roles in the retrofitting flow chart. From left to right, each actor plays their role in the EE retrofitting flow chart in one or some of the stages; analysis of current conditions, methodology, application and/or verification, respectively. All these players have also top to bottom or vice versa dependencies to each other while playing their role in the flow chart. Additionally, in this value chain graph, the key players role is described as being a value chain main actor, or as a service provider or as being in the enabling environment is also shown in different colours as well as they are located in different areas of the value chain.

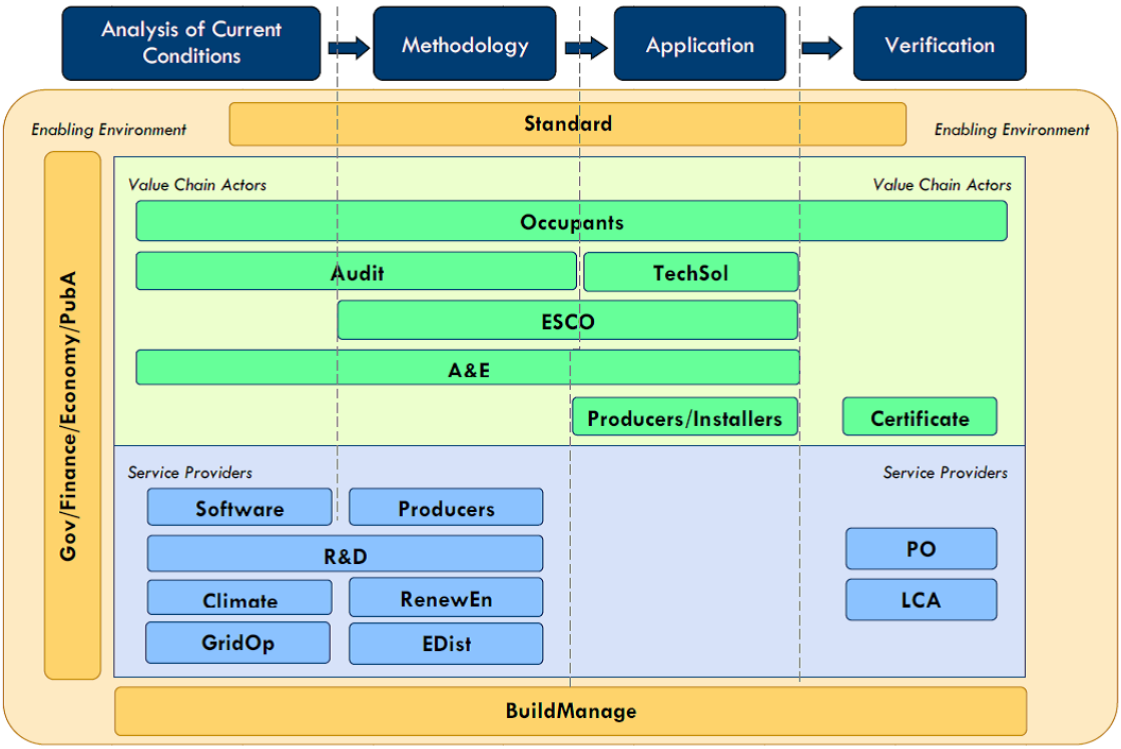

Figure 3 Energy Efficiency Retrofitting Sector's Value Chain

Abbreviations used in the Value Chain Graph

- **A&E:** Architecture and engineering companies (civil, mechanical, electrical, environmental),
- **Audit:** Energy auditing firms,
- **Build Manager:** Real Estate agents and householders and building managers,
- **Certificate:** Certification bodies,
- **Climate:** Meteorologists,
- **Economy:** Economists,

- **EDist:** Energy distributors,
- **ESCO:** Energy service companies,
- **Finance:** Banks, Financial Agents, Promoters, Subsidizers,
- **Government:** Government,
- **GridOp:** Electric Power Transmission Grid Operators (GridOp)
- **Installers:** Installers of building systems, building materials,
- **LCA:** Life cycle assessment bodies,
- **Occupants:** Homeowners and building users, occupants,
- **PO:** Intellectual property bodies and patent offices.
- **Manufacturers:** Manufacturers of building elements, building materials,
- **PubA:** Public administration and authorities (ministries, municipalities, etc.),
- **R&D:** R&D institutes, universities,
- **RenewEn:** Renewable energy companies,
- **Software:** Software developers,
- **Standard:** Standardization bodies,
- **TechSol:** Technical solutions developers companies.

Definitions:

1. **Financial Agents:** These are the Banks, Promoters, Subsidizers and other financial institutions financing green entrepreneurship as well as EE retrofitting projects.
2. **Public Administration and Government:** They act as policy makers, facilitate EE Building Retrofitting initiatives, and play a role in the development of green entrepreneurship on materials and services, etc.
3. **Standardization bodies:** They are the organizations whose primary activities are producing technical standards relevant to EE retrofitting.
4. **Software developers:** They design software for estimating the energy consumption of buildings, EE performance simulation and monitoring purposes.
5. **R&D Institutes and Universities:** These are consultants, researchers, and building scientists who produce the scientific knowledge and direct the policies.
6. **Installers:** They install the EE retrofitting measures to buildings; they need to have an idea about novel developments in the sector.
7. **Meteorologists:** The climate, and thus regulations, varies from one country to another. These actors evaluate and direct EE retrofitting actions according to different climate zones analysis.
8. **Manufacturers:** Their work is to produce building elements/materials and the fixtures for these elements which are mainly used for EE retrofitting.
9. **Technical solutions:** These actors develop and provide innovative services and design retrofitting measures for buildings. Basically the implementation of EE retrofitting ideas is done by these experts.
10. **Renewable energy:** Companies that produce energy from renewable sources, solar, wind, hydraulic, geothermal, biomass, etc.
11. **Energy distributors:** They are responsible for transporting energy to final customers or to distribution stations that sell energy to final customers.
12. **Grid Operators:** They build, maintain and provide the necessary energy network. It is possible to measure and evaluate the regional, national or International energy consumption trends to evaluate the EE retrofitting actions.

13. **Architecture and Engineering (A&E):** Generally address building energy issues within new construction, renovation and retrofitting projects. Their mission is to ensure that the buildings are constructed and/or renovated meeting the standards and building plan specifications.
14. **Energy Service Companies (ESCO):** They provide energy services and energy efficient improvement measures for building retrofitting.
15. **Energy Audit Firms:** They obtain adequate knowledge of the existing energy consumption profile of buildings, identify and quantify cost-effective energy saving opportunities and report the findings.
16. **Intellectual Property Bodies (Patent):** They are responsible for examining and issuing or rejecting patents, designs and trademarks. Protection of IPR is very important for EE retrofitting area, as there are various novel research findings.
17. **Life Cycle Assessment companies (LCA):** They evaluate the total energy consumed in all steps from acquisition of the raw material to end product step and assess the sustainability of the buildings.
18. **Certification bodies:** They provide energy performance certification. They rate the buildings on how efficient (or inefficient) they are in accordance with the certification definitions given in the standards.
19. **Building managers:** Literally, they are the financial owners of the buildings or managers of building groups. They are the ones who provide support from the government or from financial agents.
20. **Occupants:** They are the users of the building and they need to be living in energy efficient, healthy and comfortable environments.

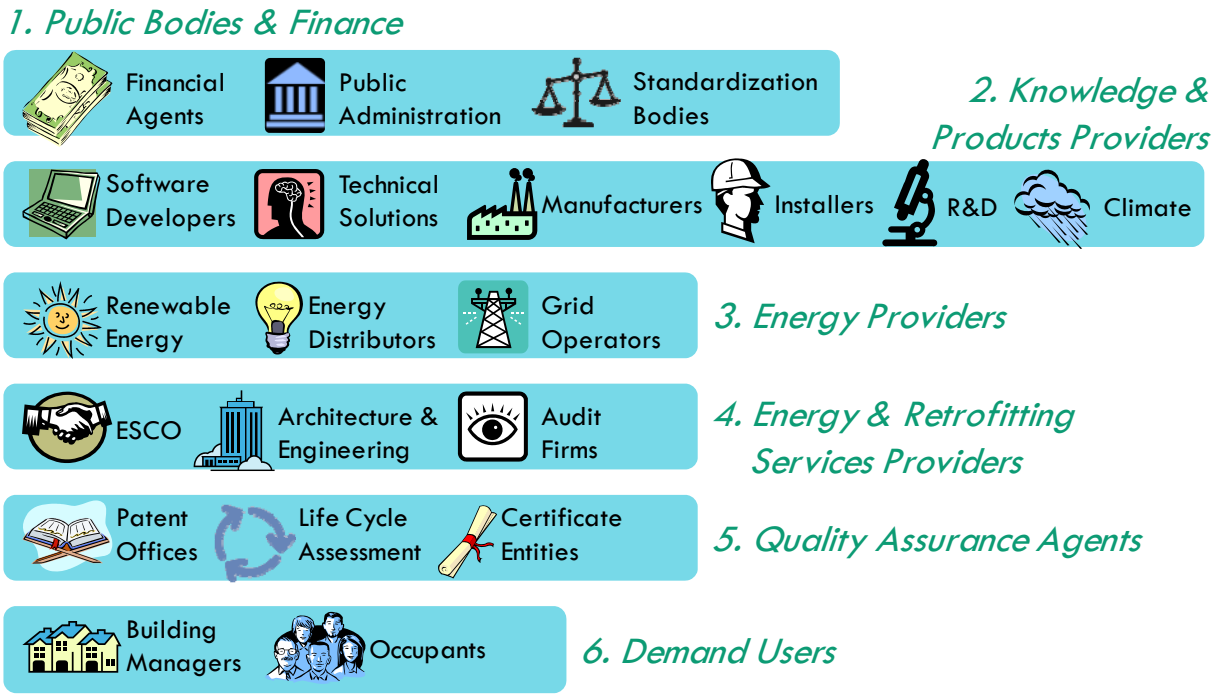

Figure 4 Value Chain Agents classified into Groups

2.2. Needs Category Definition

Based on the classification of WP1 & WP2, extensive research was carried out in WP3 with the objective to classify the needs for effective knowledge transfer through the retrofitting value chain into groups as is shown in 0. These needs, as identified through the desk research, were categorised into groups related to:

A. Skills & Awareness
B. Knowledge Management
C. Approach to R&D
D. Financial Conditions
E. Institutional & Administrative Conditions

Figure 5 Classification of the Value Chain Knowledge Transfer Needs

The complete list of KT needs as developed in Deliverable 3.1 is given in Table 1 below.

KT Need		***Description***
A1	Exposing Craftsmen to Innovation	*Traditional craftsmen need to have more exposure to retrofitting innovations.*
A2	End User Take-Up of Research Results	*The end users need to have a better capacity and motivation to take up the results of the research organisations and use these results in their buildings.*
A3	Business Society Access to Knowledge Stock	*The retrofitting business society needs to have a greater ability in knowing how to access the knowledge stock.*
A4	Managing Intellectual Property	*The business society needs to be aware of tools to manage intellectual property.*
A5	Training Architects & Engineers in Retrofitting Technology	*The construction industry professionals (including architects, civil engineers, building services engineers, project managers, building designers, etc) need increased training and exposure to retrofit technologies.*
B1	Building Consortia & Energy Efficiency Networks	*Need to have a network organisation that will organise contacts with companies, knowledge transfer from innovation groups and guidance of building teams in order to implement innovation into daily building practice.*
B2	Intra-Academy Interaction	*Research institutions have staffs that actively pursue links with industry, but need to increase interaction amongst them.*
B3	Clustering of Retrofit Market Solutions	*Need to cluster innovative solutions to address practical problems with integrated solutions*
B4	Connecting Commercial Advice to EPBD Activity	*Increased connection between technical commercial advice and the energy performance and requirements of the actual buildings.*
C1	Applicability to the End User	*Scientists need to have increased contact with the end-users in order to understand the applicability of their research.*
C2	Real-Life Evaluation of Research Results	*Scientists need to evaluate the results of their research through actual implementation of the technology in real-life situations and not only in the laboratory.*
C3	Working in Response to Market Trends	*The scientific society needs to be in increased contact with the end users in order to be able to divert their activity rapidly in response to changes in the market.*
D1	Public R&D Initiatives & Innovation Funding	*The need to increase business motivation through the availability of public R&D initiatives and innovation funding.*
D2	Support Industry in R&D Take-Up	*Need for financial support for the industry to take up results of scientific innovation.*
D3	Support Occupant in Retrofit Take-Up	*Need for financial support for the occupants to be in a better position to invest in retrofitting technology.*
E1	Guidelines for R&D to Address End-User Knowledge Needs	*The need for increased European Commission guidelines for the research organisations that address the needs of the end-users in terms of the knowledge that is required for uptake of the retrofitting technologies.*

E2	Criteria for R&D Project Evaluation	*The need for evaluating publicly funded research projects via it's applicability to the end-user.*

Table 1 Knowledge Transfer Needs

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 and its relevance as per their individual experience on working within the retrofitting value chain. The table below displays the knowledge transfer need as classified from the most to the least important as identified by the value chain agents.

	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 Classification of the Knowledge Transfer Needs

Identification of the Knowledge Management Tools that are best suited to convey knowledge through the value chain have been studied and defined in Work Package 4. WP4 identified knowledge management and training tools that are suggested as the best options for impacting positively on the rate of knowledge transfer through the value chain. The analysis carried out aims to become a valuable guide and good practice basis to any organization or agent that intends to develop training material

that is engaging, interesting and attractive for a specific target group according to their needs and expectations, while at the same time valorising the new information and communication technologies (ICT) available on the world wide web to be used for education and informational activities.

In addition, consideration 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.

The matrix below summarises the 3 "most selected" ICT training tools for each value chain agent, and an additional one ranking distinguishing "most selected" ICT training tools from the information receivers' and information providers' point of view. The results shown in this matrix are also the basis of the functioning of the Knowledge Transfer Framework itself, such as the favourite tools per agent, per agent as receiver/ provider, etc..

Ranking Results per Agent

Ranking Results (Receiver/ Provider)

	MOST VOTED TOOLS PER NEED		1º	2º	3º	1º	2º	3º
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 portals	Online forums
		P				Podcasts (audio lectures)	Simulation	Educational Games
	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 portals	Online forums
		P				Blog-based learning, social networking sites, community portals	Podcasts (audio lectures)	Communication Tools
	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 portals	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 portals	Online forums
		P				Blog-based learning, social networking sites, community portals	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)	Communication Tools
	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	Communication Tools
	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	Podcasts (audio lectures)
	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*	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 portals	e-learning courses"(synchronous, asynchronous)
		P				Webinars, web meetings, online conferences	Communication Tools	Podcasts (audio lectures)
	Energy Dsitributors	*R*	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 portals	e-learning courses"(synchronous, asynchronous)
		P				Webinars, web meetings, online conferences	Communication Tools	Podcasts (audio lectures)
	Grid Operators	*R*	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 portals	e-learning courses"(synchronous, asynchronous)
		P				Webinars, web meetings, online conferences	Communication Tools	Podcasts (audio lectures)
Energy & Retrofitting Services	**ESCO**	*R*	Webinars, web meetings, online conferences	Communication Tools	Simulation	Webinars, web meetings, online conferences	Communication Tools	Simulation
		P				Webinars, web meetings, online conferences	Simulation	e-book
	Architect. & Engineer.	*R*	Webinars, web meetings, online conferences	Simulation	Video in learning courses	Webinars, web meetings, online conferences	Simulation	Video in learning courses
		P				Simulation	Video in learning courses	Online forums
	Audit Firms	*R*	Webinars, web meetings,	Communication Tools	Simulation	Webinars, web meetings, online conferences	Communication Tools	Simulation

		P	online conferences			Webinars, web meetings, online conferences	Simulation	e-book
Quality assurance	**Patent Offices**	R P	Online forums	Webinars, web meetings, online conferences	Communication Tools	Webinars, web meetings, online conferences e-learning courses"(synchronous, asynchronous)	Online forums Mind mapping	Mobile learning (mlearning) Blog-based learning, social networking sites, community portals
Quality assurance	**Life Cycle Assessment**	R P	Online forums	Webinars, web meetings, online conferences	Communication Tools	Webinars, web meetings, online conferences e-learning courses"(synchronous, asynchronous)	Online forums Mind mapping	Mobile learning (mlearning) Communication Tools
Quality assurance	**Certificate entities**	R P	Online forums	Webinars, web meetings, online conferences	Communication Tools	Webinars, web meetings, online conferences Online forums	Online forums e-book	Mobile learning (mlearning) Communication Tools
Demand	**Building Managers**	R P	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Online forums	Blog-based learning, social networking sites, community portals Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences Webinars, web meetings, online conferences	Online forums Online forums
Demand	**Occupants**	R	Blog-based learning, social networking	Webinars, web meetings, online conferences	Online forums	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Online forums

		P	sites, community portals			Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Online forums

		MOST VOTED TOOLS PER NEED		Ranking Results per Need 1º	2º	3º	Ranking Results (Receiver/ Provider) 1º	2º	3º
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 conferences	e-learning courses (synchronous, asynchronous)
			P				Communication Tools	Webinars, web meetings, online conferences	e-book
	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 portals	Communication Tools	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community portals
			P				Simulation	Augmented Reality applications & software, Virtual Reality worlds	Webinars, web meetings, online conferences
	B4	Connecting	*R*	Webinars, web meetings,	Online forums	Podcasts (audio lectures)	Podcasts (audio lectures)	Online forums	Mind mapping

		technical commercial advice to EPBD - energy performance and requirements of the actual buildings.	P	online conferences			Webinars, web meetings, online conferences	Online forums	Blog-based learning, social networking sites, community portals
Task 4.3	D3	Occupants need financial support to invest in EE retrofitting technology.	R P	Communication Tools	Webinars, web meetings, online conferences	Video in learning courses	Communication Tools Podcasts (audio lectures)	Webinars, web meetings, online conferences Communication Tools	Video in learning courses Wiki tools
	D2	Industry needs financial support to take up results of scientific innovation.	R P	Webinars, web meetings, online conferences	Communication Tools	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences Communication Tools	Blog-based learning, social networking sites, community portals Online forums	Communication Tools Webinars, web meetings, online conferences
	A4	The business society needs to be aware of tools to manage intellectual property.	R P	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Mobile learning (mlearning)	Blog-based learning, social networking sites, community portals Blog-based learning, social networking	Webinars, web meetings, online conferences Webinars, web meetings, online	Mobile learning (mlearning)

							sites, community portals	conferences		
Task 4.4	A5	Training of construction professionals (including architects, civil engineers, building services engineers, project managers, building designers, etc) in retrofit technologies.	*R*	Webinars, web meetings, online conferences	Simulation	e-learning courses (synchronous, asynchronous)	Webinars, web meetings, online conferences	Simulation	e-learning courses (synchronous, asynchronous)	
			P				Simulation	Webinars, web meetings, online conferences	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 conferences	Communication Tools	Video in learning courses	
			P				Webinars, web meetings, online conferences	Communication Tools	Augmented Reality applications & software, Virtual Reality worlds	
	E2	Evaluation of publicly funded research projects via it's applicability to	*R*	Blog-based learning, social networking sites, community portals	Online forums	Simulation	Online forums	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	

		the end-user.	*P*				Simulation	Blog-based learning, social networking sites, community portals	Podcasts (audio lectures)
	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 conferences Webinars, web meetings, online conferences	Video in learning courses Educational Games	Educational Games e-learning courses (synchronous, asynchronous)
	B1	Establishing network organisations that will coordinate knowledge transfer from innovation groups and assist in implementing innovation into daily building practice.	*R* *P*	Online forums	Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences Online forums	Online forums Blog-based learning, social networking sites, community portals	Blog-based learning, social networking sites, community portals Wiki tools
	C3	R&D to divert their activity rapidly in response to changes in the	*R*	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Video in learning courses	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Video in learning courses

		market.	P				Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Online forums
	B2	Increased interaction amongst research institutions.	R P	Online forums	Communication Tools	Webinars, web meetings, online conferences	Webinars, web meetings, online conferences Communication Tools	Online forums Online forums	e-learning courses (synchronous, asynchronous) Blog-based learning, social networking sites, community portals
	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 conferences Video in learning courses	Blog-based learning, social networking sites, community portals Webinars, web meetings, online conferences	Video in learning courses Online forums
Task 4.5	A1	Training of traditional craftsmen on EE retrofitting innovations.	R P	Simulation	Video in learning courses	e-book	Simulation Simulation	Video in learning courses Educational Games	Webinars, web meetings, online conferences Video in learning courses

	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 portals	Online forums Online forums	Blog-based learning, social networking sites, community portals e-learning courses (synchronous, asynchronous)	Video in learning courses e-book
	C2	Real-life evaluation of research results.	*R* *P*	Communication Tools	Blog-based learning, social networking sites, community portals	Webinars, web meetings, online conferences	Communication Tools Communication Tools	Blog-based learning, social networking sites, community portals Blog-based learning, social networking sites, community portals	Online forums Webinars, web meetings, online conferences
	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 Blog-based learning, social networking sites, community portals	Online forums Webinars, web meetings, online conferences	Blog-based learning, social networking sites, community portals Online forums

Table 3 Mapping between Needs, Agents and Tools

2.3. The Approach used for the Practical Procedures, Guidelines and Recommendations: The Business Model Canvas Approach

There are many different approaches to business model development and each one of them has its strengths and weaknesses. WP6 deliverables are based on the Business Canvas Framework which is widely supported around the world and has become the standard in many industries. The Business Model Canvas was initially proposed by Alexander Osterwalder[4], based on his earlier work on Business Model Ontology[5]. The framework has been built by a collaborative effort of hundreds of industry practitioners and there is already an industry working with tools and concepts around this framework.

The basic requirement for a Business Model Canvas is to be able to respond to a basic question: what is your business model and how will you earn money? According to Osterwalder & Pigneur[6], a business model describes the rationale of how an organization creates, delivers, and captures value. The process of business model construction is part of the overall business strategy. The Business Model Canvas is nowadays one of the most used frameworks for describing the elements of a business model. A business model is the description of the overall environment of an organization and is defined by several aspects, which answer the questions of how an organization creates, delivers, and captures value in economic, social, cultural or other contexts. The main business model functions are: articulating the value proposition; identifying market segments; defining the value chain and the firm's position; formulating the competitive strategy as well as addressing broader social and environmental aspects.

The Business Model Canvas in the framework of WP6 of ee-WiSE is used as a methodological approach rather than a technical approach. It provides a way of thinking and a mind-set that each deliverable of the specific work packages follows. It is a theoretical framework upon which the analysis will rely on the categories and questions that have to be answered in order to elaborate the four different deliverables. Each deliverable is developed based on the same information but from a different point of view. The Business Model Canvas is displayed in 0 below.

[4] http://alexosterwalder.com/

[5] Alexander Osterwalder (2004). The Business Model Ontology - A Proposition In A Design Science Approach. PhD thesis University of Lausanne

[6] http://www.zebramc.com/introduction-to-the-business-model-canvas/

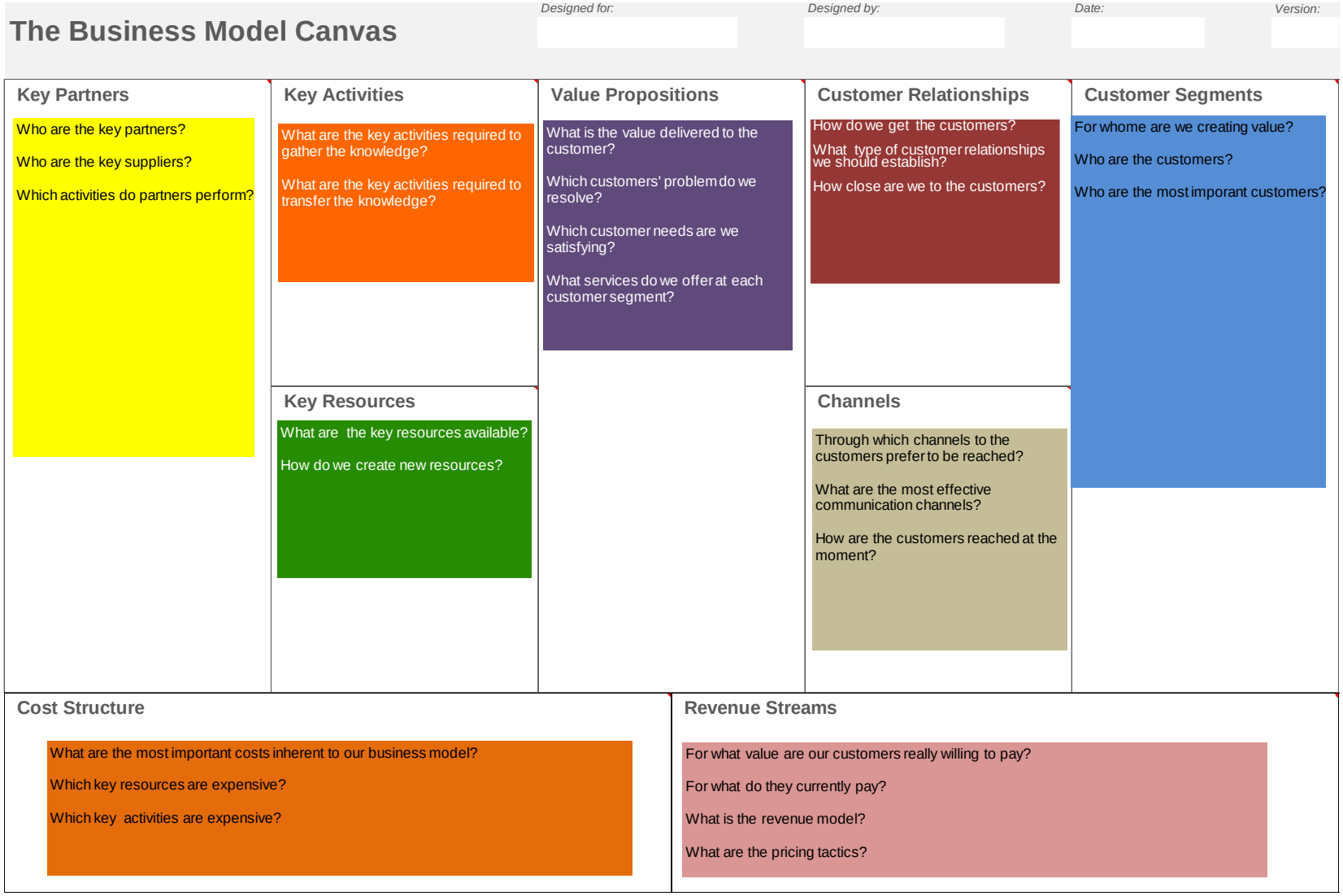

Figure 6 Analysis of the Business Model Canvas blocks

The Business Model Canvas components are:

Infrastructure

- **Key Activities.** This includes those steps that a value chain agent should take in order to be able to transfer knowledge in an added value approach, commonly known as the entity's value proposition.
- **Key Resources.** The Key Resources are those that are needed in order for the value chain agent indeed to create value for another agent and thus entice the flow of knowledge through the value chain. The Key Resources are also described as assets that are required in order to sustain and support the knowledge transfer. These resources could vary and could include the key staff involved, intellectual knowledge generated, physical infrastructure, etc.
- **Key Partners.** The partner network, or value chain agents as referred to within ee-WiSE, is the network of potential stakeholders who through collaboration can help in optimizing the operations and reduce risks of the knowledge transfer activity. For example if an agent wants to provide state of the art knowledge and hasn't got strong ties with universities that are usually the creators of state of the art knowledge, then the business model in any case couldn't be sustained for a long period of time since the knowledge offered will soon be out-dated.

Offering

- **Value Proposition.** This is defined as the knowledge base that the value chain agent s will offer to meet the needs of the knowledge receivers. According to Osterwalder, (2004), *a company's value proposition is what distinguishes itself from its competitors. The value proposition provides value through various elements such as newness, performance, customization, "getting the job done", design, brand/status, price, cost reduction, risk reduction, accessibility, and convenience/usability. The value propositions may be:*
    - Quantitative- price and efficiency
    - Qualitative- overall customer experience and outcome

Customers

- **Customer Segments.** A knowledge provider has to be able to categorize its different target groups and find ways that they could be served better. Usually in order to better sustain a knowledge transfer process for a long period of time, the needs of the various sets of knowledge receivers have to be satisfied a) in response to their different needs and b) their role in the value chain, e.g. the needs for policy makers are different to the needs of builders, so it is important to ensure that the corporate strategy will be implemented appropriately and thus satisfy the various needs of the selected group of clients.
- **Channels.** A channel refers to the knowledge transfer methodologies through which the knowledge will be provided to reach the targeted customers. Effective channels will distribute the knowledge in ways that are fast, efficient and cost effective. A knowledge provider can reach the knowledge receiver either through its own channels or partner/collaborators channels or through a combination of both.
- **Customer Relationship.** Usually this is one of the most important parts of a business model. A knowledge provider should be able to have solid relationship with the knowledge receivers if they want to ensure the survival and success of their knowledge transfer process.

Business Model Steps

In order to be able use the business model approach, three steps need to be followed:

Step 1 – The idea

- Scope: Solve our Target customers' problem and satisfy their needs
- How:

a) Understand Target End User Needs
b) Define the Need it will cover and how it will succeed
c) Create a Specific Offering

- Unsatisfied End User need?
- Doing Business in a different way?
- A new product or service that the market hasn't seen yet, or that is offered with a different or better value proposition?

Step 2 - Deliverable Design – (The added Value Formula)

- Scope: Identify the Key Resources & Key Processes

a) Present the strengths and weaknesses
b) Identify the Key Resources
c) Identify the Key Processes

Step 3 – Practical procedures, recommendations and Guidelines Report

- Scope: The restructuring of the deliverable based on the value chain agents feedback in relation to their expertise

a) Business objects have to be defined optimally from an information point of view as well as from a behavioural point of view
b) Information units have to be arranged in logical clusters and a certain information element must exist only once
c) Business procedures must be broken down to their elementary components, duplicate components have to be eliminated and the remaining components have to be assigned to a single owner - normally a certain agent

2.4. Methodology for 6.4: Recommendations and guidelines for knowledge transfer regarding Standardization, Public Procurement and Certification

As it is described previously, "Standardization, public procurement and certification" are the processes in which Public Bodies are directly involved within the energy retrofitting sector. These agents range from Administration and Regulation Organizations, to Certifying Entities being responsible for the development of the legal framework and the creation of other type of requirements which can affect the market. More concretely:

- Standardization: Process by which a set of rules, guidelines or characteristics are established by consensus and approved by a recognized body in a document that provides the achievement of the results as best as possible by a product/services for the consumers. Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits and can be national, international, etc. Regulation is the process of development of legislative rules by the competent authority. It can be based on Standards or can incorporate them, with technical requirements, specifications, etc.

- Public Procurement: Process by which Public Sector (by different Bodies or Entities) purchase products or services from the private sector. It takes place from local to international level, and the process is subject to specific rules, policies, technical and legal conditions, etc. in function of the type of contracting, covering how the relevant decisions are made. In all cases, it is mandatory to follow this set of rules procurement (advertise for suppliers, the grounds on which they choose a supplier, and the way in which they measure and enforce the requirements they put on the supplier, etc.) developed in terms of transparency, competitively between suppliers The usual aims of such a system will be to take advantage of competitiveness between suppliers and to reduce the economic impact for the citizens.
- Certification (process): Useful procedure to add credibility, by demonstrating that a certain product or service meets the expectations of the final users and customers. In construction sector, certification processes are usually legal or contractual requirements. The developers of tasks involved in that processes are the Certification Bodies, as independent entities that provide a written assurance (a certificate) that the product, service or system in question meets specific requirements. At the same time, the Accreditation Body, as supervisor of the certification process, authorize the Certification Entity its operation according to national/international standards.

These definitions imply that the rest of agents within the value chain will be involved in the development of this deliverable, either providers or receivers of knowledge, in function of the needs and the concrete value chain members. In fact, Patent Offices or Financial Agents, despite of that they can be out of the Public Sector, will take part of the targeted group of this report.

Based on the philosophy of Business Model Canvas, described in previous section, some different aspects will be analyzed in Deliverable 6.4 for every issue to improve (Regulation, Public procurement and Certification processes) always establishing the Knowledge Transfer in energy efficiency retrofitting as the "core business":

- Which requests of knowledge have the targeted groups of each need?
- What and how can be transferred as knowledge of each need?
- Are they disposed to get an initial investment for getting the knowledge about each need?
- Which legal tendencies or techniques are hindering/promoting the knowledge transfer in each need?

Within the guidelines and recommendation section of this deliverable, the knowledge transfer needs have been categorised into a three-fold approach: Knowledge Generation, Knowledge Sharing and Knowledge Dissemination. The definition of the three-fold approach has been elaborated in section 3.

More importantly, the guidelines and recommendations described in this deliverable are a result of the research that has been carried out in the previous ee-WiSE Work Packages together with sourcing of existing best practices that could lead to the implementation of a higher level of awareness and better enable the knowledge transfer through the EE retrofitting value regarding Standardization, Public Procurement and Certification within the value chain.

A deeper explanation of the philosophy of work and the methodology is provided in Section 4.1.

3. THREE FOLD APPROACH

3.1. Categorization of the Knowledge Transfer Needs

In order to achieve the Knowledge Transfer global strategy these WP6 closing deliverables have been organized, considering the 3 main aspects of *Knowledge Transfer* when focusing on the KT Needs. *Knowledge Transfer* involves not only good knowledge sharing, but generating new knowledge in a comprehensive way and effective knowledge dissemination as well. Thus, the 3 pillars of the Knowledge Transfer global strategy: Knowledge Generation, Knowledge Sharing and Knowledge Dissemination are used to categorize the sector's needs and cater for the threefold approach in a holistic way. Figure 8 below shows the classification of the needs in their 5 needs categories and the 3 Knowledge Transfer categories.

Knowledge Generation	
A1	Exposing Craftsmen to innovation
A3	Business Society Access to Knowledge Stock
A5	Training Architects & Engineers in Retrofitting Technology
B2	Intra-Academic Interaction
C3	Working in Response to Market Trends
D1	Public R&D Initiatives & Innovation Funding
E2	Criteria for R&D Project Evaluation

Knowledge Sharing	
C1	Applicability to the End User
C2	Real-Life Evaluation of Research Results
C4	Results Focusing on Practical Benefits

Knowledge Dissemination	
A2	End user Take Up of Research Results
A4	Managing Intellectual Property
B1	Building Consortia & Energy Efficiency Networks
B3	Clustering of Retrofit Market Solutions
B4	Connecting Commercial Advice to EPBD Activity
D2	Support Industry in R&D Take-Up
D3	Support Occupant in Retrofit Take-Up
E1	Guidelines for R&D to Address End-User Knowledge Needs

A. SKILLS & AWARENESS
B. KNOWLEDGE MANAGEMENT
C. R&D APPROACH
D. FINANCIAL
E. INSTITUTIONAL & ADMINISTRATIVE

Figure 7 Knowledge Transfer Needs within the three fold approach

3.2. Needs per categories

The table below shows how the needs have been associated within each one of the deliverables' topics. Each deliverable contains recommendations on the specific topics that are provided to assist in

satisfying the knowledge transfer needs associated to the topic in a comprehensive manner, using the Knowledge Transfer threefold approach background

		Knowledge Transfer Needs within the three fold approach	Deliverables			
			D6.1	D6.2	D6.3	D6.4
Knowledge Generation	A1	Exposing Craftsmen to innovation	1	1	1	
	A3	Business Society Access to Knowledge Stock	1	1		
	A5	Training Architects & Engineers in Retrofitting Technology	1	1	1	1
	B2	Intra-Academic Interaction			1	1
	C3	Working in Response to Market Trends	1	1		
	D1	Public R&D Initiatives & Innovation Funding	1			1
	E2	Criteria for R&D Project Evaluation	1	1		1
Knowledge Sharing	C1	Applicability to the End User	1	1	1	
	C2	Real-Life Evaluation of Research Results	1	1		1
	C4	Results Focusing on Practical Benefits		1	1	
Knowledge Dissemination	A2	End user Take Up of Research Results	1	1	1	
	A4	Managing Intellectual Property	1	1		1
	B1	Building Consortia & Energy Efficiency Networks		1	1	1
	B3	Clustering of Retrofit Market Solutions		1	1	
	B4	Connecting Commercial Advice to EPBD Activity	1	1	1	1
	D2	Support Industry in R&D Take-Up	1	1		1
	D3	Support Occupant in Retrofit Take-Up	1	1		1
	E1	Guidelines for R&D to Address End-User Knowledge Needs		1	1	
		Needs Per Deliverable	13	16	10	10

Table 4 Knowledge Transfer Needs assigned to each WP6 Deliverable

Guidelines and recommendations for each of the knowledge transfer needs as they have been split into the three-fold approach are detailed in Chapter 4 where methods to meet the knowledge transfer needs are explored and tackled within the knowledge generation, knowledge sharing and knowledge dissemination points of view.

3.3. Analysis of Knowledge Transfer Needs Related to Knowledge Generation

Knowledge generation is defined as the development of research outputs or research syntheses that allows for the formation of new ideas through interactions between explicit and tacit knowledge in human minds.[7] The ability to generate new knowledge is crucial to the success of an industry and to improving the effectiveness of technology.

Knowledge generation according to Nonaka's SECI Model (2001)[8] is about continuous transfer, combination, and conversion of the two different types of knowledge (Frost 2014)[9], namely:

- Explicit knowledge

  Knowledge that is formalised and codified and is stored in documents, databases, etc. This knowledge is fairly easy to identify, store and retrieve.

- Tacit knowledge

  This is intuitive knowledge and know-how that is rooted in experience and practice. Although this knowledge is hard to communicate, it is regarded as the most valuable source of knowledge and the most likely to lead to breakthroughs in technology.

Within the SECI Model, Nonaka describes four modes of knowledge generation:

a. **Socialization** - This dimension relates to social interaction (tacit to tacit knowledge transfer), sharing knowledge through face-to-face encounters or through experiences. For example, meetings and brainstorm sessions form part of this mode of interaction.
b. **Externalization** - Publishing knowledge that is tacit in nature into a form that makes it explicit allowing it to be shared with others, thus becoming the basis for generation of new knowledge. For example, concepts, images and written documents used in new product development.
c. **Combination** - This dimension relates to the usage of existing explicit knowledge banks that are organised, edited and processed to create new explicit knowledge. For example, the building of prototypes.
d. **Internalization** - The process of internalisation refers to learning by doing thus converting explicit knowledge into tacit knowledge. It is a process of continuous individual and collective knowledge generation that gives the added ability to see connections and recognise patterns thus creating the possibility for new ideas and concepts.

Also, Cook and Brown (1999)[10] distinguish between explicit and tacit knowledge, and suggest that knowledge generation is a product of the interplay between them. The shift in condition between the possession of knowledge and the act of knowing - something that comes about through practice, action, and interaction- is the driving force in the generation of new knowledge. Furthermore, in order for this interplay to be most fruitful, it is important to support unstructured work environments in areas where creativity and innovation are important.

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[7] Business Directory: definition for knowledge creation
[8] Nonaka, I., Toyama, R., Byosiere, Ph. (2001) "A theory of organizational knowledge creation: understanding the dynamic process of creating knowledge", in: Dierkes, M., Antal, A.B., Child, J., Nonaka, I. (eds.) Handbook of organizational learning and knowledge, pp.487-491, Oxford University Press, Oxford.
[9] Frost, Alan (2014). A Synthesis of Knowledge Management Failure Factors. http://www.knowledge-management-tools.net/A%20Synthesis%20of%20Knowledge%20Management%20Failure%20Factors.pdf
[10] Cook, S.D.N. and J.S. Brown (1999) Bridging Epistemologies: The Generative Dance between Organizational Knowledge and Organizational Knowing. In: Organization Science 10 (4), pp.381-400.

One might say that knowledge generation relies on knowledge sharing combined with the ability to put knowledge into practice in an environment which supports interaction and experimentation. Knowledge is generated through practice, collaboration, interaction, and education, as the different knowledge types are shared and converted. Beyond this, knowledge generation is also supported by relevant information and data which can improve decisions and serve as building blocks in the generation of new knowledge.

According to the methodological framework described earlier and the Business Model Canvas approach, ee-WiSE consortium members had used the Business Model Canvas components in order to categorize the information collected from all the previous work packages of the project. The categorization is based on the needs as they had been distributed in WP3.

<table>
<tr><th colspan="3">A3. Business Society Access to Knowledge Stock</th></tr>
<tr><td>Key partners</td><td colspan="2">1.Knowledge and Products Providers
- Technical Solutions Developer
- Software Developer
- Manufacturer
2.Energy and Retrofitting Services Providers
- ESCO</td></tr>
<tr><td>Key activities</td><td colspan="2">Training for staff and companies.
Build an educational framework that will provide a qualification to the new generation of knowledge transfer professionals.</td></tr>
<tr><td>Key resources</td><td colspan="2">Create an operation pattern to narrow the gap of knowledge sharing among groups.</td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (www.ee-wise.eu)</td><td>Networks
http://www2.schneider-electric.com/sites/corporate/en/products-services/training/energy-university/energy-university.page
http://www.socialhousingaction.com</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Material should be clear and easy to be adopted by the members.
- A visual explanation of how the EE system works and what is installed is necessary.
- Educational Game tools are among the favourite choice for this knowledge transfer, so software developers need to get involved.
- Solution designer have to use videos apart from the e-material to disseminate EE building components and systems.
- Experimental building projects have a lot of useful demonstration material for EE training.
- Actors involved in an experimental building, have to allow visitors for a living demonstration in order to maximise the impact of the training experience and assist in connecting EE directly to the market.
- Experimental buildings have to be updated by collaborating with solutions designers to test their EE measures.</td><td>Best Practices
Schneider Electric- Energy University is a free online, educational resource, offering vendor-neutral courses on energy efficiency topics to help the user identify, implement, and monitor efficiency improvements within an organization.
Social Housing Action to Reduce Energy Consumption is an initiative consisting of forums that were set up for each of the 8 countries involved; training sessions took place, involving 1000 participants, mainly residents, but also energy experts, building managers, housing funds, local authorities, teachers and architecture students.</td></tr>
</table>

Customer Relationship	Webinars, web meetings, online conferences Long-term strong relationship (personal and automated) Databanks
Channels	- Educational Material, Educational Games, - Simulation Solutions, - Videos, - Leaflets with instructions, - Brochures with simple drawings
Customer Segments	**1. Public Bodies & Finance** - Public Administration **2. Knowledge and Products Providers** - Installer **3. Energy and Retrofitting Services Providers** - Architect & Engineer

C3. Working in Response to Market Trends		
Key partners	**1. Knowledge and Products Providers** - Technical Solutions Developer - R&D	
Key activities	Modifications and improvements to the innovation that are resulting from a change originating in response to market feedback Form academic-industry collaborations to improve the effectiveness of the innovation process.	
Key resources	Guidelines for knowledge providers to effectively transfer their technology and knowledge. These guidelines may take the form of: - videos in which the problems and solutions can be demonstrated, - Forums where the exchange of problems and solutions can be debated, - Webinars for the Academic Industry cooperation. - Tools to allow the R&D society to understand the needs of the traditional workforce and the end users.	
Value Proposition	**Tools** KTF Tool (ee-wise.eu)	**Networks** www.construction21.eu www.elih-med.eu/Layout/elih-med/
	Tips for Effective Knowledge transfer - Create a mechanism (forum) that will relay the R&D institutes with the market needs. - If you are involved in an experimental building, allow visitors for a living demonstration in order to maximise the training experience and assist in connecting EE directly to the market. - Keep the experimental building updated by collaborating with solutions designers to test their EE measures.	**Best Practices** - Construction21 Europe. The European platform for green building practitioners - ELIH-MED aims to test and identify feasible cost-effective technical solutions and innovative financial mechanisms. It does so through large scale pilot actions backed by the ERDF (European Regional Development Fund).
Customer Relationship	Close contact through online resources (such as social networking sites, etc.) Automated contact through (CRM, mail, newsletter, etc.) Personal Contact through support agents.	
Channels	Videos, community portals, Webinars, web meetings, online conferences Presentations on the topic, Samples, A platform on which to create blog-based learning.	
Customer Segments	**1.Public Bodies & Finance** - Public Administration - Government **2.Knowledge and Products Providers** - Installers **3.Energy and Retrofitting Services Providers** - Architect & Engineer	

	4.Demand - Build Manager - Occupant

D1. Public R&D Initiatives & Innovation Funding		
Key partners	**1. Knowledge products & services** - Software developers - Manufacturers - R&D **2. Energy Retrofitting sector** - Architects & Engineer **3. Energy Providers** - Renewable Energy	
Key activities	Master plans involving public and private actors in R&D activity. Recommendations to have both EU wide and R&D plans that support R&D activities	
Key resources	Videos of economist that easily explain the existing financial tools, Web tools forums, Webinars	
Value Proposition	**Tools** KTF Tool (ee-wise.eu)	**Networks** http://www.kickstarter.com/ www.marie-medstrategic.eu/en/success-stories-or-best-practices/best-practices.html
	Tips for Effective Knowledge transfer - Create publicly funded websites in which new ideas can be funded either for financial institutes or VC's. - Create forums where new engineers will present new ideas and financial institutions will finance them.	**Best Practices** MARIE PROJECT - development of model "solutions" regarding policy, funding mechanisms, products & services.
Customer Relationship	Long-term strong relationship (personal and automated) Automated systems (databanks)	
Channels	Leaflets. Webinars, web meetings, online conferences. Communication Tools. Video in learning courses. Basic start materials about bank products.	
Customer Segments	**1. Knowledge products & services** - Installers **2. Demand** Occupants	

E2. Criteria for R&D Project Evaluation	
Key partners	**1. Knowledge products & services** - R&D
Key activities	- Involve the end users in the evaluation of research projects. - Including project evaluation criteria that will rate the final result.
Key resources	Videos of economist that easily explain the existing financial tools, Web tools Forums, Webinars

Value Proposition	**Tools eg KTF Tool (ee-wise.eu)** KTF	**Networks** http://www.elih-med.eu/Layout/elih-med/ http://fund.corpbank.bg/ https://www.youtube.com/watch?v=sq_mndyvy6a
	Tips for Effective Knowledge transfer -Create an easily accessible FAQ Forum with who to use EE measures. -Use videos apart for the e-material to disseminate EE building components and systems if you are a solutions designer. -Present to the end user the needs of the new projects.	**Best Practices** -Programme for energy-efficient retrofitting of Bulgarian Households; -Energy Efficiency in Low Income Housing in the Mediterranean.
Customer Relationship	Automated Systems (Databanks) Active Relationship (Personal Contact) (customer feedback) Blog-based learning, community Online forums Simulation	
Channels	- Government - Simulation solutions, - social networking sites - Transparent information how to deal with the projects, how to search for the information in the database, - Platform for the forums	
Customer Segments	**1. Public Bodies & Finances** - Public Administration - Government **2. Demand** - Building Managers	

A5. Training Architects & Engineers in Retrofitting Technologies	
Key partners	**1.Public Bodies & Finance** - Public Administration - Government **2.Knowledge and Products Providers** - Technical Solutions Developer - R&D
Key activities	- Implement higher level of education in retrofitting Technologies for construction professionals. - Increase or adopt Curriculum for Bachelor or Master Degrees.
Key resources	- New courses at universities or revising curriculum for bachelor and master Degree to improve knowledge transfer for Architects and Engineers. Introduce Architects and Engineers to experimental buildings and demonstrative videos of new technologies.

Value Proposition	**Tools** KTF Tool (ee-wise.eu)	**Networks** www2.schneider-electric.com/sites/corporate/en/products-services/training/energy-university/energy-university.page http://www.youtube.com/watch?v=chl5_z-gkWg
	Tips for Effective Knowledge transfer - Keep always a visual explanation of how the EE system works and is installed. - Notice that simulation tools are the favourite choice for this Knowledge, so software developers need to get involved. - Use videos apart for the e-material to disseminate EE building components and systems if you are a solutions designer. - Experimental building projects have a lot of useful demonstration material for EE training. - If you are related to an experimental building, allow visitors for a living demonstration in order to produce impulse the training experience and assist connecting EE directly to the market. - Keep the experimental building updated by collaborating with solutions designers to test their EE measures. - Short-courses together with other informal learning events such as seminars and workshops would serve to provide further educational opportunities.	**Best Practices** - Schneider Electric- Energy University- the Energy University is a free online educational resource, offering vendor-neutral courses on energy efficiency topics to help the user identify, implement, and monitor efficiency improvements within an organization. http://www2.schneider-electric.com/sites/corporate/en/products-services/training/energy-university/energy-university.page - Some more examples can be taken from the Project BUILD UP Skills Malta [http://www.buildupskillsmalta.com/]
Customer Relationship	Long-term deep relationship (Customer contact) Automated Systems (Newsletter, Webinars, Web Meetings, Online Conferences, Simulation) e-learning courses (synchronous, asynchronous)	
Channels	Videos, interactive presentations in dissemination events and experimental building visits.	
Customer Segments	**2.Energy and Retrofitting Services Providers** - Architect & Engineer	

A1. Exposing Craftsmen to innovation	
Key partners	**1.Knowledge and Products Providers** - Technical Solutions Developer - Software Developer - Manufacturer - R&D **2.Energy and Retrofitting Services Providers** - Architect & Engineer **3.Energy Providers** - Renewable Energy
Key activities	Expose the traditional craftsmen to demonstration projects. Tools for the home-owner and traditional craftsmen for the decision making

<table>
<tr><td>Key resources</td><td colspan="2">- Material related to Experimental Building Projects, thus the exploitation of buildings and tools to disseminate results is necessary.
- Creating a connection of Experimental Building Projects to training programmes for traditional craftsmen.
- Creating a connection of Experimental Building Projects to knowledge providers to expose their technology.</td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (ee-wise.eu)</td><td>Networks
http://www.proyectoedea.com/en/
http://e4rsim2.aidico.es/
http://www.arfrisol.es/ARFRISOLportal/
http://www.youtube.com/user/Trainenergy/videos
http://www.u4energy.eu/web/guest/33</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Keep always a visual and simple explanation of how the EE system works and is installed.
- Notice that simulation tools are the favourite choice for this Knowledge, so software developers need to get involved.
- Use videos apart for the e-material to disseminate EE building components and systems if you are a solutions designer.
- Experimental building projects have a lot of useful demonstration material for EE training.
- If you are related to an experimental building, allow visitors for a living demonstration in order to produce impulse the training experience and assist connecting EE directly to the market.
- Keep the experimental building updated by collaborating with solutions designers to test their EE measures.</td><td>Best Practices
- http://www.proyectoedea.com/en/
Research project that developed 2 Experimental buildings to obtain comparative real-time data from passive/active systems simulated and tested. Visitors are welcomed!
- http://e4rsim2.aidico.es/
Simulation Tool developed throughout E4R Project which is capable of providing an estimated energy efficiency evaluation of your building online.
- http://www.arfrisol.es/ARFRISOLportal/
PSE-ARFRISOL is a project that aims for the adequacy of bioclimatic architecture and solar energy in symbolic public buildings. The simulation of the buildings can be checked online.
- http://www.youtube.com/user/Trainenergy/videos
Train energy YouTube channel that provides videos explaining hoe EE measures work and are installed in real life. (German - English)
- http://www.u4energy.eu/web/guest/33
The U4energy website offers resources to help teachers, students and school management introduce energy efficiency in the classroom and replicate proven success stories!</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Active Relationship (Personal Contact)
Automated Systems (Newsletter, Simulation, Video in learning courses, e-book)</td></tr>
<tr><td>Channels</td><td colspan="2">Brochures with simple explanations, e-material, simulation tools and videos, which contain demonstration of EE measures.</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1.Knowledge and Products Providers
- Installer
2.Energy and Retrofitting Services Providers
- Architect & Engineer</td></tr>
<tr><td colspan="3">B2. Intra-Academic Interaction</td></tr>
<tr><td>Key partners</td><td colspan="2">1.Knowledge and Products Providers
- R&D</td></tr>
<tr><td>Key activities</td><td colspan="2">- Movement of academic staff between R&D institutions
- Creation of knowledge banks,
- Setting up of online forums,
- Organization of brokerage events for creating collaborative joint research activities on specific retrofitting topics.</td></tr>
<tr><td>Key resources</td><td colspan="2">Guidelines for knowledge providers to disseminate and to make available to the rest of the academic and research community the outcomes of the research.
The guidelines will be designed to be implemented in different type of activities such as: videos, podcasts, Forums, Webinars.</td></tr>
</table>

Value Proposition	**Tools** KTF Tool (ee-wise.eu)	**Networks** www.proyectoedea.com/en/ www.enea.it http://www.youtube.com/watch?v=t5Dm6Dxn6B4
	Tips for Effective Knowledge transfer - Create a Database with all the already developed EE solutions - Create an open Calendar with all EE events which can be updated from all the involved agents - Keep always a visual explanation of how the EE system works and is installed. - Use videos apart for the e-material to disseminate EE building components and systems if you are a solutions designer. - Experimental building projects have a lot of useful demonstration material for EE training. - If you are related to an experimental building, allow visitors for a living demonstration in order to produce impulse the training experience and assist connecting EE directly to the market. - Keep the experimental building updated by collaborating with solutions designers to test their EE measures.	**Best Practices** EDEA, ENEA
Customer Relationship	Active Relationship (Personal Contact) (Seminars, academic meetings) Online Contact (Video In Learning Courses, Podcast (audio lectures), Webinars, Web Meetings, Online conferences)	
Channels	Videos, Presentations on the topic, Samples, Audio lectures.	
Customer Segments	**1.Public Bodies & Finance** - Public Administration - Government	

3.4. Analysis of Knowledge Transfer Needs Related to Knowledge Sharing

Szulanski (1996)[11] found that when the relationship between the source of knowledge and the recipient was distant or problematic, knowledge transfer was more difficult. The ability to identify and share knowledge is an important factor for market competitive advantage.

The three factors that Szulanski found to be the greatest impediments to knowledge sharing are: causal ambiguity of the knowledge itself, lack of absorptive capacity of the recipient, and an arduous relationship between the source and recipient. These impediments are all knowledge-related barriers. In contrast, conventional wisdom on why knowledge is hard to transfer within firms has focused almost exclusively on motivational barriers such as interdivisional jealousy, lack of incentives, lack of buy-in, resistance to change, lack of commitment, etc. The results of this study indicate that the difficulty firms have in transferring knowledge may be less because organizations do not want to learn and more because they do not know how to. Therefore, firms may want to consider devoting resources to develop

[11] SZULANSKI, G. (1996): "Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm", Strategic Management Journal, Vol. 17 (Special Issue), pp. 27-43.

the learning capacities of organizational units, fostering closer relationships between units, and systematically understanding and communicating practices.

Using this principle, knowledge sharing within the ee-WiSE project refers to exposing of generated or existing knowledge to others in order to improve skills and ideas about energy efficiency retrofitting. In the framework of addressing the above idea that knowledge is not shared effectively because organisations do not know how to do that, ee-WiSE had developed knowledge transfer guidelines which are synopsized on the needs tables analysed based on the Business Model Canvas.

The analysis includes the methods for sharing the knowledge: requiring face-to-face contact, opportunities for experiential learning, communication channels, innovative methods, etc. In all instances, the study of the needs for knowledge sharing takes into account the various forms of sharing mechanisms that are best suited for interpretation and adaptation by the value chain agent who is receiving the information.

<table>
<tr><th colspan="3">C4. Results Focusing on Practical Benefits</th></tr>
<tr><td>Key partners</td><td colspan="2">1.Knowledge and Products Providers
- Technical Solutions Developer
- R&D
- Manufactures
2.Energy Providers
- Renewable Energy
3.Energy and Retrofitting Services Providers
- ESCO</td></tr>
<tr><td>Key activities</td><td colspan="2">- Readily available information from product and technology data sheets.
- Knowledge sharing events (encouraged by admin) where the owners and supporting agents of the new retrofit technologies will have the opportunity to present the results of the new technology advances to the rest of the value chain.</td></tr>
<tr><td>Key resources</td><td colspan="2">- Experimental Building Projects that will allow the retrofit technologies providers to obtain the practical benefit input from the building testing and expose it.
- Collection of energy performance data gathered from owners' impressions to be defined as an essential duty after a technology is installed, both in terms of economic savings and comfort.
- ESCOs can conduct the exposition of owners' impressions on their own, while additionally they can follow a dual team approach presentation between the owner and the solution provider.</td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (ee-wise.eu)</td><td>Networks
http://www.ase.org/blog/top-10-energy-efficiency-smartphone-apps
https://www.gov.uk/government/news/save-energy-cash-this-winter
http://www.smarthome.com/forum/default.asp
http://blog.togetherwesave.com/
www.maimona.org
www.elih-med.eu/Layout/elih-med/</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- If you are a Public Admin, foster opinion exchange in community websites between end-users regarding benefits on EE R&D results experienced. End-users listen to other end-users!
- Translate your energy or CO2 saving results, and include economical savings and comfort level information.</td><td>Best Practices
- Maimona Foundation aims to support the development of business plans and strategic plans in all project types. It assists in finding partners for projects as well as relevant information to move the project forward together with risk capital procurement and financial resources</td></tr>
</table>

	- Include images with the information you provide. - Develop a "social" version of your information sheet avoiding technical language and including more interesting parameters for society.	sourcing. - ELIH-MED aims to test and identify feasible cost-effective technical solutions and innovative financial mechanisms. It does so through large scale pilot actions backed by the ERDF (European Regional Development Fund).
Customer Relationship	Long-term relationship (Personal Contact) Online Contact (Customer feedback)	
Channels	Forums and community portals are the most familiar tools for end-users, but e-material is also welcomed Video In Learning Courses, Podcast (audio lectures), Webinars, Web Meetings, Online conferences	
Customer Segments	**1.Knowledge and Products Providers** - Installer **2.Energy and Retrofitting Services Providers** - Architect & Engineer **3.Demand** - Occupant - Building Manager	

C2. Real-life evaluation of research results		
Key partners	**1.Public Bodies & Finance** - Public Administration - Finance **2.Knowledge and Products Providers** - Technical Solutions Developer - R&D - Manufacturer **3.Quality *Assurance*** - Life Cycle Assessment - Certificate Body - Patent Office	
Key activities	Exposing the advances of the research activity to the end users through a stock of buildings that can be used for real-life testing.	
Key resources	Supply of real life cases to allow evaluation of research results: - Real-life experimental buildings: from experimental building projects. - Public buildings: belonging to the Public Administration. - Residential buildings: belonging to owners that have been encouraged through subsidies and reduced rates. Comparison of the scientific feedback obtained with the owners' impressions and presented to the scientific community and general society.	
Value Proposition	**Tools** KTF Tool (ee-wise.eu)	**Networks** http://enercitee.eu/Sub-Projects/RIEEB---Regional-Impact-with-Energy-Efficient-Buildings,57/ http://www.renov.proyectoedea.com/es/content/objetivos-0 www.esesh.eu www.construction21.eu www.cicstart.org www.elih-med.eu/Layout/elih-med/ www.iee-square.eu;www.eaci-projects.eu/iee/page/Page.jsp?op=project_detail&prid=1738

	Tips for Effective Knowledge **transfer** - Public Admin bodies should develop a program to promote collaboration between house-owners and solutions designers, considering also support from financial agents. - Quality Assurance agents, provide assistance for certificates in the real-life testing approach. - Solutions designers are to develop easy understandable material that explains the EE system and its monitoring process. - Create methods to gather the users' experiences and translate them into technical input to improve the technology. - Experimental building projects and other existing buildings should be considered for real-life evaluation.	**Best Practices** - Practical guidelines and policy recommendations produced within EnercitEE will provide valuable assistance for European regions aiming to improve their energy performance and policies. - The eSESH project aims at helping Europe to meet emission targets by achieving a significant reduction of energy consumption in European social housing. - Construction21 Europe. The European platform for green building practitioners - CIC Start Online is a collaborative effort between universities for academic consultancy on sustainable building design and refurbishment. - ELIH-MED aims to test and identify feasible cost-effective technical solutions and innovative financial mechanisms. It does so through large scale pilot actions backed by the ERDF (European Regional Development Fund). - The SQUARE project aims to assure energy efficient retrofitting of multifamily housing with good indoor environment, in a systematic and controlled way.
Customer Relationship	Active Relationship (Personal Contact) (meetings) Online Contact (Communication Tools, Blog-based learning, social networking sites, community portals, Webinars, web meetings, online conferences)	
Channels	Guidelines, community websites, and online events.	
Customer Segments	**1.Public Bodies & Finance** - Public Administration **2.Knowledge and Products Providers** - Technical Solutions Developer - R&D - Installer - Manufacturer **3.Energy and Retrofitting Services Providers** - Architect & Engineer **4.Quality Assurance** - Life Cycle Assessment - Certificate Body **5.Demand** - Occupant - Building Manager	

C1. Applicability to the End User	
Key partners	**1.Knowledge and Products Providers** - Installer - Manufacturer **2.Public Bodies & Finance** - Pub. A **3.Demand** - Occupants
Key activities	Increase interaction between scientists and the agents at the end of the value chain. Create new communication channels between agents to improve EE solutions with their feedback
Key resources	Improve communication skills in scientists and ensure recognition of communication efforts.

<table>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (ee-wise.eu)</td><td>Networks
http://bookshop.europa.eu/en/energy-cbWmMKABstNjAAAAEjNZEY4e5L/</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Use simple questionnaires with scale question type.
- If you are an occupant, make sure the feedback provided is related to the analysed technology.
- If you are a Manufacturer or Installer, you can provide valuable feedback to scientists regarding the technology production and implementations processes.
- If you are a Public Admin, your feedback is important regarding the chances the EE technology has to success in society and to receive an investment incentive.
- Public Admin, need to moderate the communication channels and foster scientist to participate on them.
- Also, Public Admin can gather this feedback, and translate it into summarized guidelines for scientist to improve communication skills.</td><td>Best Practices
Online European bookshop where the research results are exposed in a friendly way.</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Automated Systems (questionnaires, customer feedback)
Online Contact (Webinars, web meetings, online conferences, Online Forums, Communication Tools)</td></tr>
<tr><td>Channels</td><td colspan="2">Online events, Forums or any communication tool where scientists and end-users are able to interact</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1.Knowledge and Products Providers
- R&D
- Technical Solutions Developer</td></tr>
</table>

3.5. Analysis of Knowledge Transfer Needs Related to Knowledge Dissemination

Knowledge dissemination is defined as the communication of research outputs to potential users with the expectation that the knowledge will be used conceptually (for learning, enlightenment, or the acquisition of new perspectives or attitudes) or instrumentally (in the form of modified or new practices). Knowledge dissemination is a crucial part of knowledge management since it ensures that knowledge is made available to those who need it.

The essential factors for effective dissemination that lead to eventual knowledge utilisation are:

- USER: establishing the appropriate target group
- MEDIUM: means via which information is to be disseminated
- CONTENT: knowledge base that is to be disseminated
- CONTEXT: presentation of the knowledge in the way that is most meaningful to the user
- SOURCE: the knowledge provider

Figure 8 Knowledge utilisation as a result of knowledge dissemination

Effective dissemination depends on other factors including optimum budget allocation, society, culture, etc. Various analytical tools exist to gauge the effectiveness of the knowledge dissemination activity, e.g. questionnaires. A guide to creating an effective knowledge dissemination plan defines ten main essential elements[12]:

1. **Goals:** Determine and document the goals of your dissemination effort for your proposed project.
2. **Objectives**: Associate each goal with one or more objectives that clarifies what you are trying to accomplish through your dissemination activities.
3. **Users:** Describe the scope and characteristics of the "potential users" that your dissemination activities are designed to reach for each of your objectives.
4. **Content:** Identify, at least, the basic elements of the projected content you have to disseminate to each of the potential user groups identified.
5. **Source(s):** Identify the primary source or sources that each potential user group is already tied into or most respects as an information source. Consider ways to partner with these sources in your dissemination efforts.
6. **Medium:** Describe the medium or media through which the content of your message can best be best delivered to your potential users and describe the capabilities and resources that will be required of potential users to access the content for each medium to be used.
7. **Success:** Describe how you will know if your dissemination activities have been successful. If data is to be gathered, describe how, when, and who will gather it.
8. **Access:** Describe how you will promote access to your information and how you will archive information that may be requested at a later date. Consider that most people will use your project-related information when they perceive a need for it – not necessarily when you have completed your research project.

[12] Verite' Dissemination Planning Guide http://www.verite.org

9. **Availability:** Identify strategies for promoting awareness of the availability of your research-based information and the availability of alternate available formats.
10. **Barriers:** Identify potential barriers that may interfere with the targeted users' access or utilization of your information and develop actions to reduce these barriers.

The added value of knowledge dissemination is that its effect will increase awareness on a particular subject and allow for informed choices from amongst a group of alternatives. Dissemination does not include direct feedback from the audience but is a one-way flow of knowledge from the knowledge source to the potential market.

E1. Guidelines for R&D to Address End-User Knowledge Needs	
Key partners	**1.Public Bodies & Finance** - Public Administration - Government **2.Knowledge and Products Providers** - Technical Solutions Developer - Software Developer - Installer - Manufacturer **3.Energy and Retrofitting Services Providers** - Architect & Engineer - Audit - ESCO **4.Quality Assurance** - Certificate Body **5.Demand** - Occupant - Building Manager
Key activities	- Professional knowledge brokers - Knowledge transfer at a cluster level - Clear definition of the end-user/target groups
Key resources	- Model solutions for policy, funding mechanisms, products and services - Common guidelines and policies to improve the competitiveness of innovative and sustainable models for housing that respond to the challenges of a growing population. - Development of a common model/strategy for training, certification and knowledge dissemination.

<table>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (ee-wise.eu)</td><td>Networks
http://www.marie-medstrategic.eu/en.html
http://www.irh-med.eu/
http://www.educarue.eu/</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Include references to the feedback received from users (public bodies, product / service providers, quality assurance, occupants) in the guidelines
- Provide direct audio or/and video connection between the trainers and the trainees
- Use Web conferencing / Webinar as another option
- Enable communication / training in remote locations through web conferencing events, meetings, workshops
- Provide either a recorded copy of the event, or a means for a subscriber to record the event.</td><td>Best Practices
- MARIE - Mediterranean Building Rethinking For Energy Efficiency Improvement. The mission of the MARIE project is to co-construct a strategy for energy efficiency in existing buildings in the Mediterranean region.
The main idea to replicate here is the development of a model “solution” regarding policy, funding mechanisms, products & services.
- IRH-Med - Innovative Residential Housing for the Mediterranean. The idea here is to develop common guidelines & policies to improve the competitiveness of innovative and sustainable models for housing that respond to the challenges of a growing population.
- Educa-RUE - Energy Efficiency Paths in Educational Buildings. The project will develop actions (legislation, certification, education, finance, training, information and dissemination) for the implementation of the Directive on local building. Again here the idea is to develop a common model/strategy, but Educa-RUE is more elaborate and addresses also training, certification and dissemination.</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Automated Systems (questionnaires, customer feedback)
Online Contact (Communication Tools, Webinars, web meetings, online conferences, e-books)</td></tr>
<tr><td>Channels</td><td colspan="2">EC guidelines on dissemination / exploitation of research project results in an appropriate format (webinars, online forums, blog based learning, e-book)</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1.Knowledge and Products Providers
- R&D</td></tr>
</table>

<table>
<tr><th colspan="3">B4. Connecting Commercial Advice to EPBD Activity</th></tr>
<tr><td>Key partners</td><td colspan="2">1. Energy & Retrofitting services
- ESCO´s
- Architects and engineers
- Audit firms
2. Demand
- Occupants</td></tr>
<tr><td>Key activities</td><td colspan="2">Commercial advice in line with national EPBD requirements
Clustering framework
Offering the relevant and complete information to the consumers</td></tr>
<tr><td>Key resources</td><td colspan="2"></td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools eg KTF Tool (ee-wise.eu)
KTF</td><td>Networks
http://www.youtube.com/watch?v=GHk2Tk9E6AI

http://www.building.co.uk/is-the-government-ready-for-the-epbd?/5036193.articleB4</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Use Podcasts as a less expensive tool to offer a mobile, interesting and convenient way for accessing information / training material
- Employ Web conferencing / Webinar learning tools which offer options for online or offline (pre-recorded events) communication / training in remote locations
- Include Online Forums and Podcasts in your "toolbox" as two other popular options
- Please bear in mind that the audience is technically competent so scientific jargon maybe used in the learning material</td><td>Best Practices
- ENEA - Entrusting the role of providing commercial advice in line with national EPBD requirements to competent National Agencies
- FOREST - Carrying out networking and clustering actions
- PadovaFIT! - Offering complete information to the consumers through pilot retrofit projects</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Active Relationship (Personal Contact) (meetings)
Online Contact (Webinars, Web Meeting, Online Conferences, Online forums. Podcasts (audio lectures)</td></tr>
<tr><td>Channels</td><td colspan="2">Educational Material, Audio Lectures, Brochures, Leaflets,
Data concerning EE Technologies and Building Regulations and Certification</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1. Public Bodies & Finances:
- Public Administration
- Government
- Standardization
2. Knowledge products & services:
- Software developers
- Technical solutions
- Installers
3. Energy & Retrofitting services
- ESCO´s
- Architects and engineers
- Audit firms</td></tr>
</table>

<table>
<tr><th colspan="3">B1. Building Consortia & Energy Efficiency Networks</th></tr>
<tr><td>Key partners</td><td colspan="2">1. Knowledge products & services:
- Software developers
- Technical solutions
- Manufacturers
- R&D
- Climate
2. Quality Assurance
- Patent Offices
- Life Cycle Assessment</td></tr>
<tr><td>Key activities</td><td colspan="2">- Formation of consortia and energy efficiency networks
- Information transfer through media exposure, organization of exhibitions, documentation archiving, demonstration projects, training plans, networking
- Creation of a EU-wide recognized standardization body.</td></tr>
<tr><td>Key resources</td><td colspan="2">Green Touch™:
Basic Communications Systems
The European platform for green building practitioners
Energised communities</td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools
KTF Tool (ee-wise.eu)</td><td>Networks
https://www.youtube.com/watch?v=yfsDetHMiow
https://www.youtube.com/watch?v=1WjBilqyTxU
http://www.youtube.com/watch?v=cN6YrrqaLIM</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Should be created open discussions with moderators that will advise , learn how to deal with the topics
- Keep always a visual explanation of how the EE system works and is installed.
- Notice that even though the simulation tools are not the favourite choice for this Knowledge, a very fast simulated outcome on the results of EE will create lot of advantages</td><td>Best Practices
The best method to start a cluster initiative online. The easiest way would be putting together other existing networks in each Mediterranean country. The networks related to each type of agent should be considered.
The tool should establish a connection with other networks in the sector related to daily building practice and with innovation in EE retrofitting.
Should provide K sharing opportunities online, such as forums, debates, etc, or a way to contact each other or publishing news.</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Online Contact (Webinars, web meetings, online conferences
Blog-based learning, social networking sites, community portals)
Active Relationship (Personal Contact) (meetings)</td></tr>
<tr><td>Channels</td><td colspan="2">Presentations
Podcasts
Platform to create the forums and platform to create blogs</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1. Public Bodies & Finance
- Public Administration
- Standardization
2. Knowledge products & services:
- Installers
3. Energy providers:
- Renewable energy
- Energy distributors
- Grid operators
4. Energy & Retrofitting services
- ESCO´s
- Architects and engineers
- Audit firms</td></tr>
</table>

<table>
<tr><th colspan="3">B3. Clustering of Retrofit Market Solutions</th></tr>
<tr><td>Key partners</td><td colspan="2">1. Knowledge and Products Providers
- Technical Solutions Developer
- Manufacturer
- R&D</td></tr>
<tr><td>Key activities</td><td colspan="2">Create regional networking of companies working in retrofitting innovation.</td></tr>
<tr><td>Key resources</td><td colspan="2">Guidelines to be implemented in different type of activities such as: videos podcasts forums and training material regarding the use of the proposed solution.</td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (ee-wise.eu)</td><td>Networks
ww.powerhouseeurope.eu/nc/cases_resources/case_studies/single_view/?tx_phecasestudies_pi3%5Bid%5D=106</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Keep always a visual explanation of how the EE system works and is installed.
- Notice that simulation tools are the favourite choice for this Knowledge, so software developers need to get involved.
- Use videos apart for the e-material to disseminate EE building components and systems if you are a solutions designer.
- Experimental building projects have a lot of useful demonstration material for EE training.
- If you are related to an experimental building, allow visitors for a living demonstration in order to produce impulse the training experience and assist connecting EE directly to the market.
- Keep the experimental building updated by collaborating with solutions designers to test their EE measures.</td><td>Best Practices
- Case study: AID system for Thermal Refurbishment of Social Housing Stock in Champagne Ardennes Region- Identifications of needs; Implementation of the partnership, Support to project managers, Financial Engineering, Funding and monitoring of project.
- Case Study: Arte Genova Pilot Via Sertoli,9- Shelter Project: maintain the thermal comfort conditions inside the units; reduce heat loss; assess, the energy efficiency of each dwelling.</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Online and Automated Systems (Video in learning courses, Webinars, web meetings, online conferences, Online forums)
Active Relationship (Personal Contact)</td></tr>
<tr><td>Channels</td><td colspan="2">Material required for this issue are video clips about retrofitting, presentations bout how society deals with energy efficiency. Topics that cover the needs the retrofit.</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1.Public Bodies & Finance
- Public Administration
- Government
2.Knowledge and Products Providers
- Installer
3.Demand
- Occupant
- Building Manager
4.Energy Providers
- Renewable Energy
- Energy Distributor</td></tr>
</table>

<table>
<tr><th colspan="3">D3. Support Occupant in Retrofit Take-Up</th></tr>
<tr><td>Key partners</td><td colspan="2">1. Public Bodies & Finance
- Pub A
- Gov.
2.Quality Assurance
- Certificate</td></tr>
<tr><td>Key activities</td><td colspan="2">- The development of appropriate financial instruments to promote the installation of energy efficient housing and retrofit technologies
- Control of the eligibility to make use of the financial benefits in each country could be done through a measurement of the building energy efficiency level
- Set up of beneficial grants, green loans and tax revisions (value added tax, property tax, income tax).</td></tr>
<tr><td>Key resources</td><td colspan="2">Create forums or trainings where experts from R&D, Finance institutions will discuss (explain) the need, opportunities to invest in EE retrofitting technology.

Financial institutions should create new products optimal for different occupants, and also government can reduce taxation in energy efficiency buildings</td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (ee-wise.eu)</td><td>Networks
www.warmupnorth.com/

- www.eaci-projects.eu/iee/page/Page.jsp?op=project_detail&prid=2533
- http://www.youtube.com/watch?v=P9I8zingLjE
- http://www.youtube.com/watch?v=W_YIrxBHukM</td></tr>
<tr><td>Tips for Effective Knowledge transfer

- The produced material that promotes the financial products has to be in a understandable form the Occupants perspective.

- The Financial products has to be transparent
- Notice that simulation / games tools are not among the favorite choice for this Knowledge, but it can be easy for the occupants to understand the Pros /Cons of the EE retrofitting technology
- Use videos apart for the e-material to disseminate EE building components and systems if you are a solutions designer.
- Experimental building projects have a lot of useful demonstration material for EE training.
- If you are related to an experimental building, allow visitors for a living demonstration in order to produce impulse the training experience and assist connecting EE directly to the market</td><td>Best Practices
Newcastle City Council (NCC) is a signatory of the Covenant of Mayors since January 2008. Following the City Climate Change strategy and the Sustainable Energy Action plan (SEAP) both approved in October 2010, the Council is actively involved in developing and implementing actions to meet the SEAP targets. Technical assistance is provided for the delivery of a large scale, city wide, cross tenure housing retro fit program of energy efficiency and renewable measures. The investment and financing model is based on 10,000 to 15,000 homes to be retrofitted and will start with a first phase on targeting 5,000 homes over the 3-year project period. The investment scheme is based on the UK Green Deal and the project will set up a delivery body to carry out the retrofitting program. NCC is leading on this development work as a "pathfinder" for all the Local Authorities in the North East of England Region</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Online Contact (Communication Tools, Webinars, Web meetings, Online Conferences, Video in Learning Courses)
Active Relationship (Personal Contact)</td></tr>
<tr><td>Channels</td><td colspan="2">Information about how to interact with financial products</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1.Public Bodies & Finance</td></tr>
</table>

	- Financial Agents **2.Demand** - Occupants

D2. Support Industry in R&D Take-Up		
Key partners	**1.Knowledge Product Providers** - Technical Solutions - Manufactures - Installers **2.Energy Providers** - Renewable Energy **3.Energy Retrofitting Services** - ESCO **4.Quality Assurance** - Certificate Entries	
Key activities	- The development of appropriate financial instruments to promote the installation of energy efficient housing and retrofit technologies - Control of the eligibility to make use of the financial benefits in each country could be done through a measurement of the building energy efficiency level - Set up of beneficial grants, green loans and tax revisions (value added tax, property tax, income tax).	
Key resources	As many research efforts are frustrated and remains ideas or theoretical data that can't be developed into products, the aim of the KT solution is foster the financial support to the industry in order to market up take the scientific results into products.	
Value Proposition	**Tools** KTF Tool (ee-wise.eu)	**Networks** http://www.eaci-projects.eu/iee/page/Page.jsp?op=project_detail&prid=1519 https://www.youtube.com/watch?v=Ax0oooYAQLc https://www.youtube.com/watch?v=K7y50oT7Rio#start=0:00;end=6:16;cycles=-1;autoreplay=false;showoptions=false
	Tips for Effective Knowledge transfer - Financial Institutions has to communicate the new financial products - Financial institutes has to be close to the EE Market and Industry - Development of appropriate financial instruments to foster cooperation between industry and R&D entities. - These instruments can for example include the setting up of grants for promotion of innovative products, tax revisions on items related to innovation sourcing (e.g. attendance to expo fairs, seminars, and patent fees). - To control financial benefits, it might be appropriate to install an associated quality assurance scheme to ensure the actual diffusion and implementation of the retrofit.	**Best Practices** Educa-RUE, through a number of interconnected actions, will develop an optimal process to be applied and replicated at local level. The project will develop actions for the qualification of the technicians and certifiers which will have a key role in the implementation of the Directive on local building. Educa-RUE will study possible improvements in the applicative procedures of the Directive, supporting and enhancing specific financial tools and procedural incentives to promote the more efficient use of energy in building As the project will act upon a range of problem areas such as legislation, certification, education, economic and financial issues, training, information and dissemination, the first direct beneficiaries of the project results will be local policy makers. The involvement of local government players is ensured by the composition of the partnership belonging to 4 EU countries and the attention focused on the issue of energy efficiency at local level. The Local levels will act, where existing, through the collaboration of Local energy agencies, ensuring technical support an eventually training capacity.
Customer Relationship	Long-term deep relationship Active Relationship (Personal Contact) Online Contact (Webinars , Web meetings, Online conferences, Communication Tools, Blog –	

	based learning, social networking sites, Community portals)
Channels	Brochures how to interact with financial institutions, Leaflets about financial products
Customer Segments	**1.Public Bodies & Finance** - Financial Agents - Gov **2.Demand** - Occupants

A4. Managing Intellectual Property		
Key partners	**1.Knowledge Product Providers** - Technical Solutions - Manufacturers - R&D	
Key activities	- Revaluate the question of a single European ownership model especially for publicly funded research. - Initiatives originating from third-party organizations providing consultancy on knowledge sharing would be of further benefit to the business society. - Intellectual property training. Access to online journals some of which are open access and free.	
Key resources	The intellectual property of a company is one of the most valuable assets which can be used to fund new R&D projects, thus this KT solution is designed to make the business society aware of the available tools to manage IP rights in order to achieve innovation .	
Value Proposition	**Tools** KTF Tool (ee-wise.eu)	**Networks** http://www.escolimburg2020.be/ http://www.marie-medstrategic.eu/en.html https://www.youtube.com/watch?v=YR6ZGzNnemA https://www.youtube.com/watch?v=R2j-2HMTpJI
	Tips for Effective Knowledge transfer - Create the appropriate material that disseminates the Intellectual property procedures	**Best Practices** - ESCOLIMBURG2020- the project aims to accelerate and upscale the concrete implementation of energy efficiency and renewable energy measures in the public building stock by making use of an ESCO-model, relieving the local authorities from complex investment processes. - MARIE- to develop and adopt new regulatory requirements and new institutional tools to achieve the goals established by the new European Directive (EPBD); find new financial mechanisms that can be used to stimulate the thermal rehabilitation of buildings
Customer Relationship	Long-term relationship Automated Systems (Databanks) Automated Communication (Blog-based learning, Social networking sites, Community portals, Webinars, web meetings, online conferences, Mobile learning)	
Channels	Forums or trainings where experts from industry will discuss (explain) how Intellectual property can help the promotion and dissemination of new products and at the same time protect the investment.	
Customer Segments	**1.Public Bodies Finance** - Public Administration - Gov	

<table>
<tr><th colspan="3">A2. End user Take Up of Research Results</th></tr>
<tr><td>Key partners</td><td colspan="2">1.Knowledge Product Providers
- Software Developers
- Technical Solutions
- Manufactures
- Installers
- R&D
2.Energy Providers
- Renewable Energy
3.Energy Retrofitting Services
- ESCO
- A&E</td></tr>
<tr><td>Key activities</td><td colspan="2">End-User mobilization Events,
Training & Education Actions,
Model (Demo) Solutions, or Web / Social Media</td></tr>
<tr><td>Key resources</td><td colspan="2">The specific knowledge transfer actions aim to inform building occupants and owners about the latest technological solutions and trends in the EE retro-fitting market. Real demonstration projects can also be designed and implemented based on viable business models where the investment necessary is set against the future economic as well as environmental benefits</td></tr>
<tr><td rowspan="2">Value Proposition</td><td>Tools

KTF Tool (ee-wise.eu)</td><td>Networks
http://energy.gov/articles/energy-saver-101-infographic-home-heating
http://www.ngridenergyworld.com/efficiency/t_book.html
http://www.youtube.com/watch?v=uSL5QmRKyOA</td></tr>
<tr><td>Tips for Effective Knowledge transfer
- Present learning material in a simple and concise manner, avoiding scientific language and technical jargon
- Make use of EC guidelines for research results dissemination for valuable feedback / ideas
- Employ Web conferencing / Webinar learning tools which offer options for online or offline (pre-recorded events) communication / training in remote locations
- Use simulation tools as another preferred option which can be produced in all fields through computer games, role-plays, or building models
- Create an immersive learning experience through simulation tools which are suitable for all people with different cultural backgrounds</td><td>Best Practices

- ECHO ACTION - to encourage active involvement of end-users, local economic actors, financial institutes, and local energy providers to facilitate the implementation of local energy plans.

- Social Housing Action - to reduce energy consumption through good practices sharing on retrofitting technologies that address energy concerns and changes in behaviour
-
- Take your energy back - to mobilize end-users through a Smart-e Buildings campaign (an interactive web portal linked to the main social networks like Twitter and Facebook).</td></tr>
<tr><td>Customer Relationship</td><td colspan="2">Automated Contact (Newsletter)
Online Contact (Webinars, web meetings, online conferences, Simulations, Blog- based learning)
Active Relationship (Personal Contact)</td></tr>
<tr><td>Channels</td><td colspan="2">Educational Material , Simulation Solutions, Leaflets , EE Technologies, Building Regulations and Certification</td></tr>
<tr><td>Customer Segments</td><td colspan="2">1. DEMAND
- Building Managers
- Occupants</td></tr>
</table>

3.6. Conclusion

On the basis of the information presented in the preceding tables, it appears that the needs for clustering EE retrofitting technologies, providing continuous training of both users and providers, and enhancing information sharing for both users and providers in the value chain are fundamental factors in improving knowledge transfer and reaching the EU targets for energy saving.

4. PRACTICAL PROCEDURES, RECOMMENDATIONS, GUIDELINES PER THREE FOLD APPROACH

4.1. Core issues

As it is described in Section 2.4, guidelines and practical procedures described in this deliverable will try to recommend and implement a higher level of awareness and to better enable the knowledge transfer through the energy efficiency retrofitting value through regarding Standardization, Public Procurement and Certification within the value chain.

The purposed actions will be focused on concrete knowledge transfer needs which have been categorised into a three-fold approach: Knowledge Generation, Knowledge Sharing and Knowledge Dissemination. The definition of the three-fold approach has been elaborated in section 3.

The design of the methodology for delivering this report has been based on 3 core issues focused on energy efficiency retrofitting of existing buildings. By this, they could be considered as sub-categories inside of each addressed knowledge transfer need:

- Standardization rules: Guidelines or characteristics which are established by consensus and approved in order to achieve products/services for the consumers. Standards are based on scientific results. Legislative rules, done by the competent authority, can be based on Standards or can incorporate them. The importance of the improvements of knowledge transfer about Standards and regulatory framework is essential by the correct operation of the energy efficiency refurbishment sector and the agents involved.
- Public Procurement Opportunities: Legal and Technical framework by which Public Sector (by different Bodies or Entities) purchase products or services from the private sector. The aim is to implement a system able to promote the competitiveness and to reduce the economic impact for the citizens. This process is regulated by specific rules and policies in function of the type of contracting, establishing the conditions and business plans of potential suppliers. A fluent knowledge transfer in public procurement aspects can be the main tool from the Public sector and it is essential to improve the development of construction sector, from technical to business point of view.
- Certification Processes: Useful procedure, supervised by Accreditation Bodies, to add credibility, by demonstrating that a certain product or service meets the expectations of the final users and customers. The level of accomplishment with the specific requirements is tested by Certification Bodies as independent entities. The importance of the improvement of knowledge transfer in Certification Processes is based on the needs of transparency within the construction sector, especially in energy efficiency market.

The followed strategy for knowledge transfer has been developed in order to answer 2 core questions:

"If I want to improve the knowledge transfer process in these issues, especially with the SME´s:

How should I do it?"

Who are the main agents involved in that issues?

How?

Through practical procedures for generating new ideas and knowledge, sharing the generated knowledge and use it effectively, providing recommendations for the overcome problems about knowledge transfer in standardization and regulation of products/services, about public procurement in and certification processes. Besides, additional good practices for the public cooperation with the SME´s in regulation, contracting and certification of products and services related to energy retrofitting of buildings will be defined.

Agents involved?

Governments, Public Administrations, Financial agents, Standardization Entities, Patent Offices and Certification Bodies will be the targeted agents with special attention to SME´s which can be part of different groups of the value chain.

4.1.1. Methodology Definition

Starting from the 3 main aspects (Pillars) related to the knowledge transfer process, we would like to outline them as follows:

- Knowledge Generation: *"Generating through practice, collaboration, interaction, and education".*
- Knowledge Sharing: *"Exposing of generated or existing knowledge to others in order to improve skills and ideas about energy efficiency retrofitting".*
- Knowledge Dissemination: *"Ensuring that knowledge is made available to those who need it".*

The adopted methodology is expected to improve the communication between the identified agents involved with the rest of them within the value chain and focused on the previously identified knowledge transfer needs related to energy efficiency refurbishment and their key concepts:

- A. Skills & Awareness: Training, education, information, demonstration…
- B. Knowledge Management: *Clustering & Networking, enhancement of connections…*
- C. R&D Approach: *Innovative framework, future trends, focused on real-life…*
- D. Financial: *Economic feasibility and trends, funding, aids, encouragement…*
- E. Institutional & Administrative: *Legal framework, administration, promotion…*

Guidelines, recommendations and best practices will be provided for each Knowledge Transfer Need regarding the 3 Core Issues (sub-categories), classified in function of the Knowledge Pillar.

KNOWLEDGE PILLAR *(3 Fold Approach)*	KNOWLEDGE TRANSFER NEEDS ADDRESSED		**Guidelines and Recommendations: 3 Core Issues** *(Sub-categories)*
			1. Standardization and regulation of products/services
			2. Public procurement opportunities
			3. Certification processes
Knowledge Generation	A1 **(Skills and Awareness)**	Training of construction professionals (including architects, civil engineers, building services engineers, project managers, building designers, etc) in retrofit technologies.	
	B2 **(Knowledge Management)**	Increased interaction amongst research institutions.	
	D1 **(Financial)**	Increase business motivation through public R&D initiatives and innovation funding.	
	E2 **(Institutional & Administrative)**	Evaluation of publicly funded research projects via it's applicability to the end-user.	
Knowledge Sharing	C2 **(R&D Approach)**	Real-life evaluation of research results.	
Knowledge Dissemination	A4 **(Skills and Awareness)**	The business society needs to be aware of tools to manage intellectual property.	
	B1 **(Knowledge Management)**	Establishing network organizations that will coordinate knowledge transfer from innovation groups and assist in implementing innovation into daily building practice.	
	B4 **(Knowledge Management)**	Connecting technical commercial advice to EPBD - energy performance and requirements of the actual buildings.	
	D2 **(Financial)**	Industry needs financial support to take up results of scientific innovation.	
	D3 **(Financial)**	Occupants need financial support to invest in EE retrofitting technology.	
TARGETED AGENTS OF THE VALUE CHAIN		• Government & other Public Administrations • Financial Agents • Standardization Entities • Patent Offices • Certification Bodies	

4.2. Procedures, Recommendations & Guidelines for Knowledge Generation

This section describes different recommended actions for the improvement of knowledge transfer regarding the 3 Core Issues (Standardization, Public Procurement and certification processes) taking into account the Knowledge Transfer Needs which have been categorised in line with Knowledge Generation.

This fact implies that guidelines, good procedures and best practices provided will be the focus on the formation of new ideas through interactions between explicit and tacit knowledge that involve the targeted agents of the value chain, as providers or receivers. The ability to generate new knowledge is crucial to the success of an industry and to improve the effectiveness of technology. Knowledge generation is also supported by relevant information and data which can improve decisions and serve as building blocks in the generation of new knowledge.

In conclusion, the following purposed actions try to put knowledge into practice in an environment which supports interaction and experimentation. Knowledge is generated through practice, collaboration, interaction and education:

4.2.1. Training of construction professionals (including architects, civil engineers, building services engineers, project managers, building designers, etc) in retrofit technologies

The aim is to train the technicians because they have to propose, design and implement new and efficient technologies regarding energy efficiency retrofitting of buildings. The knowledge generation of it is a main issue for targeted agents as guarantors of high quality training and supporting public initiatives.

Standardization and Regulation of Products/Services

Despite of the technical degrees of construction professionals, specific training and learning in energy efficiency retrofitting technologies can be regulated as Additional Official Education in Energy Efficiency (knowledge generation measure) which can be regulated by Public Bodies under 2 main principles:

- The contents of these training courses can be standardized, at European level, in a certain percentage in order to promote the knowledge transfer by the same way. European standardization entities would manage this process.
- Rest of skills, competences and knowledge provided should be specific for concrete products and services related to energy retrofitting which are regulated at regional/national level.

For the standardization of any product or service realized by manufacturers/developers, Financial Agents or Standardization Entities should provide economic support to them for training of construction professionals as knowledge transfer measure; The public objective are the agents within the value chain who can implement retrofit technologies into their daily work and, in consequence, into the market. Added to this, for the regulation of an innovative retrofit solution, the economic support to manufacturers/developers (SME´s) should be realized by Public Bodies and Financial Agents in order to train the construction professionals.

Public Procurement Opportunities

A mandatory set of criteria for the technical evaluation of public tenders proposals related to retrofitting of existing buildings should be established, with special importance regarding all issues related to energy efficiency measures and energy saving. Under this framework, some recommendations can be mentioned:

- The list of technical requirements in all bids should consider and value the specific training of construction professionals in energy efficiency retrofitting and technologies, especially in case of certified or regulated courses by Public Bodies.
- The applicants must ensure that the available staff has the required skills, competence and knowledge for the development for the execution of the work with energy efficiency criteria. A minimum score should be passed.
- Creation of a public database of independent construction professional trained in energy efficiency refurbishment of buildings: if independent professionals want to get to a public procurement related to energy refurbishment of buildings or any company wants to obtain a better score in the technical section of the tender through the recruitment of an independent professional, the technician must appear in a public and centralized database promoted by a public body.

Another interesting initiative from Public procurement should be the publication of specific tenders to realize training courses for construction professionals regarding new technologies in energy efficiency retrofitting of buildings as knowledge transfer measure.

Certification Processes

The certification process can be promoted by private initiatives and institutions. The objective is the knowledge transfer in EE retrofitting: a Certification process of entities/technicians trained in retrofit technologies should be implanted, at least in the Mediterranean Area. A public procedure of an optimal certification could follow these phases:

1. Accreditation/Standardization entities publish a European Norm (rules and requirements) for certifying the certification entities.
2. Certification Bodies design and implement the procedure for the verification of the Norm.
3. Standardization Bodies confirm that the protocols designed by Certification Entities are in line with the requirements and confirm them as external auditors.
4. Agents within the value chain design different training courses for construction professionals in EE retrofit technologies.
5. Certification entities audit all the aspects of the training activity and the imparters and certify the quality of the service.
6. Each professional who pass the training activities can be certified and recognised.

A complementary activity, in line with the previous procedure, is that Patent Offices could be involved on certification processes. They can promote the training of construction professionals in retrofit technologies recently patented. Because of that, the innovation in retrofitting of building is guaranteed and would be transferred to the construction sector.

It is essential to create a global strategy for training professionals in retrofit technologies with European standardized and certified training programmes, regulated by Public Bodies, economically supported and promoted through public tenders.

4.2.2. Increased interaction amongst research institutions

The aim is to bring closer and to increase interaction between Public Bodies that are involved in Energy Efficiency and R&D departments. Knowledge generation from scientific world is, most of times, not used by Public Bodies. This lack of knowledge transfer should be improved in order to take advantage the new tendencies for the update and to create a long-term regulatory framework:

Standardization and regulation of products/services

In order to improve the knowledge generation, a suitable recommendation can be the creation of public laboratories for real Energy Efficiency tests through cooperation between public and R&D sectors, developed by researchers and funded by Public Bodies and Financial Agents, in order to realize previous tests of innovative products or services which want to be legally regulated under specific standards. In fact, a specific Innovation Committee should be implanted by Public Bodies and R&D sector, in order to develop the technical requirements of these laboratories and the new regulation about EE refurbishment. In this consultant Forum, the current and future state of the art or the technical level will be provided by R&D institutions (knowledge transfer). Because of that, the new or existing regulation could be adapted and will take into account the future trends, avoiding obsolete legal framework in energy efficiency retrofitting.

These initiatives implies a close cooperation between agents involved; a calendar with periodic meetings between Public Bodies and R&D institutions should be established, based on innovation in energy efficiency retrofitting, in order to inform about the evolution of future products and services.

Public procurement opportunities

Knowledge generation by R&D institutions in public procurement related to energy efficiency refurbishment can be transferred through a better score in technical requirements and mandatory requirements in order to promote innovation in public tenders. For instance, a core recommendation should be the promotion of innovative products/services developed by R&D sector or from entities which have developed them by support or investment in R&D activities.

The encouragement for contracting a mandatory technical assistance during the execution of the tendered tasks can be a suitable procedure. R&D Institutions should provide this work. The aim would be to add an innovative point of view in each public action related with EE retrofitting in buildings.

However, research institutions can be involved on the design and development of part of technical requirements too. R&D technicians should support the redaction of Public tenders. This initiative would involve Public Bodies and R&D departments, improving the knowledge transfer and interaction between these agents. In fact, during the evaluation of proposals, a specific criterion "Level of Innovation" could be add in order to test which supply has the most innovative character and is suitable to be chosen for the execution of the tendered tasks. This evaluation procedure can be done by R&D institutions. This fact implies that R&D technicians should be part of evaluating committee hand in hand with representatives of Public Bodies.

Certification Processes

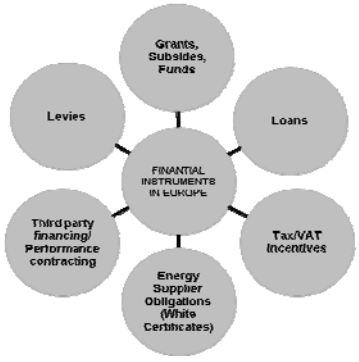
The organisation of brokerage events for creating collaborative joint research activities on existing certification processes related to retrofitting topics can be the basis of different strategies for knowledge transfer generation from R&D Institutions to Public Bodies. Under this framework, the movement of academic staff from R&D institutions and Certification/Accreditation Bodies to SME´s should be promoted. This may be short-term with part-funding programs to support the exchange of innovative best practices in certification processes.

Furthermore, with the technical support of R&D community, a specific ISO Norm/Quality Standard about level of innovation in EE retrofitting or, at least, in existing certification processes, can be a productive measure. Additional rules able to evaluate the level of innovation can be included.

A permanent, stable and smooth communication line and meeting point between R&D Institutions and Public Bodies in order to ensure the knowledge transfer through joint regulation regarding public procurement, close cooperation in development of useful products and support collaborative actions for the level of innovation measure in construction sector focused on EE refurbishment must be implanted.

4.2.3. Increase business motivation through public R&D initiatives and innovation funding

The objective is to assist public bodies to allocate more funds for the innovations and for promotions of businesses. This will give an opportunity to private sector to increase the production of rehabilitation techniques and energy resources that will generate employment.



At present, budget from different sources (from European to regional level) allows the investment in energy efficiency refurbishment. Most of times, these financial instruments (incentives and grants) promoted by Public Sector are not being effectively transferred to private sector. There is a lack of knowledge about them, especially in the 3 Core Issues analyzed, in terms of R&D initiatives.

Standardization and regulation of products/services

It is suitable the establishment of economic aids, by public bodies, for supporting the adaptation of innovative products/services to the accomplishment of standards and regulatory framework.

Public procurement opportunities

The generation of public tenders based on the implementation of R&D and innovative solutions created by private sector (real test installations, experimental products and services in public buildings, etc.) would increase the business motivation using public funding for new products or services.

With the same philosophy, public funding can be destined to the contracting people who can develop tendered tasks related to energy efficiency refurbishment topics. The promotion of employment could be valued in the scoring of public procurement.

Finally, public bodies could organize promotional events where different entities related to energy efficiency retrofitting can cooperate in order to tender jointly to public procurement, searching synergies for promoting innovative business; Knowledge generation through clustering between SME´s.

Certification Processes

Knowledge generation about certification processes needs the destination of public funding to private sector in order to support it to access to specific certification processes of products/services related to EE retrofitting. Innovation funding for this objective would increase the development of new certified

retrofit technologies and the motivation of SME´s, which could feel as an unreachable business plan without economic support.

In any case, in order to cluster the market, Public Bodies can organise promotional events where different entities related to energy efficiency retrofitting can cooperate with certification bodies for the certification of products or services.

Public economic support for increasing the business development of innovative retrofit technologies must be transferred to deliver standardized innovative products and services, promotion the participation of private sector through R&D initiatives in public procurement and providers of certified products based on innovation.

4.2.4. Evaluation of publicly funded research projects via it's applicability to the end-user

The objective is to improve communication skills in scientists and ensure recognition of communication efforts to transfer scientific knowledge to the end users. Guarantee the knowledge transfer generation from research projects to consumers implies the establishment of certain quality standards in terms of transparency, confidence and applicability of funded innovative technologies.

Standardization and regulation of products/services

Public bodies should promote funded projects that final results are destined to end-users and must be standardized and be under regulatory framework. Discussions about this type of funded research projects and the requirements for ensuring the transfer of results can be developed in forums which can link the scientists with final users in energy efficiency refurbishment of buildings, under the framework of Standardization Entities as guarantors of the quality standards of products and services.

Public procurement opportunities

The establishment of communication channels between public tenders with innovative requirements and the final users would be suitable; a certain product/service developed with public funding and introduced into the market through public procurement processes can promote the knowledge transfer and provides the awareness and recognition by the citizenship of the efforts done by public sector in energy efficiency retrofitting of buildings.

Certification Processes

Development of promotional campaigns of funded projects which have the general objective to develop new certification processes involved in refurbishment of buildings with energy criteria. The applicants should be Associations of end users (owners, tenants and general consumers) who can subcontract Certification Bodies for the technical development about issues such as ensuring quality, dissemination activities about best practices done by consumers, etc.

Funded research results about retrofit technologies should be focused on final users as main public objective, ensuring the quality, suitability and applicability through specific standards and requirements in public procurements, supported by permanently open dialogue between Public Sector and citizenship.

4.3. Procedures, Recommendations & Guidelines for Knowledge Sharing

In this section, it will be described different recommended actions for the improvement of knowledge transfer regarding the 3 Core Issues (Standardization, Public Procurement and Certification processes) taking into account the Knowledge Transfer Needs which have been categorised in line with Knowledge Sharing.

This fact implies that guidelines, good procedures and best practices provided will be focused on resources to develop the learning capacities of organizational units, fostering closer relationships between units, and systematically understanding and communicating practices; Exposing of generated or existing knowledge to others in order to improve skills and ideas about energy efficiency retrofitting is the main objective of these purposed actions.

4.3.1. Real-life evaluation of research results

Scientists need to evaluate the results of their research through actual implementation of the technology in real-life situations and not only in the laboratory. Knowledge sharing implies the development of demonstration activities, based on standards and quality procedures that allow the validity of obtained results in evaluation processes.

Standardization and regulation of products/services

Collaboration efforts by Public Administration and/or Standardization Entities to put forward a stock of buildings that can be used for real-life testing by the R&D community with the aim of contrast the behaviour in front of standards or legal framework. A joint development of this guideline would be the best choice for sharing knowledge between these agents of the value chain.

Public procurement opportunities

Public Bodies can demand, in technical requirements of public tenders, the evaluation in real-life conditions of any product/service before to execute it in public activities. This fact would provoke that the providers need to make it tested by scientists and guarantee the effects of the technology. If the previous collaboration efforts to standardize retrofit technologies put forward a stock of buildings that can be used for real-life testing by the R&D community, these evaluation infrastructures can be implemented by public procurement.

Certification Processes

The Certification Entities should develop a specific certification process with procedures about how to certify the correct evaluation of research results in real-life conditions. The knowledge transfer of this to end users, SME´s, scientists and R&D sector, etc. would imply an added value for the certification of products and services. Depending on these building criteria in certification requirements, the knowledge transfer of innovative retrofit technologies in experimental stage can be tested in real-life situation using the certification processes for ensuring the applicability to the public objective. This can be realized by:

- Real-life testing in existing buildings.
- Real-life testing in experimental buildings.

It would be necessary the establishment of a framework for knowledge sharing of certification criteria and methods for ensuring the quality standards. It should be established at European level and focused

on energy efficiency retrofitting products/services. This purposed procedure needs a comparison of each national procedure. The results can conduct the market to a European Certification for some technologies which are not considered nowadays.

The real-life evaluation of research results must ensure the knowledge sharing between the key actors: Public Bodies and Certification/Standardization Entities for the development of practical tools which can be used to guarantee the reliability of retrofit technologies.

4.4. Procedures, Recommendations & Guidelines for Knowledge Dissemination

This section describes different recommended actions for the improvement of knowledge transfer regarding the 3 Core Issues (Standardization, Public Procurement and certification processes) taking into account the Knowledge Transfer Needs which have been categorised in line with Knowledge Generation.

This fact implies that guidelines, good procedures and best practices provided will focus on the conjecture that knowledge is made available to those who need it:

4.4.1. The business society needs to be aware of tools to manage intellectual property

The intellectual property of a company is one of the most valuable assets which can be used to fund new R&D projects, thus this Knowledge Transfer Need is based on the business society, which is aware of the need of available tools to manage IP rights in order to achieve innovation. Knowledge dissemination regarding IP is to make available to construction sector a holistic framework which involves the key targeted agents for the accomplishment of all terms of regulation, ensure its update in function of the business development and protect the entities with limited resources relate to legal issues.

Standardization and regulation of products/services

It is suitable the creation of a free database that includes specific products/services about retrofit technologies which are standardized or regulated; this official ICT tool, provided by Public bodies with the support of Standardization Entities and Patent Offices, can be used as knowledge dissemination about IPR. It could be especially interesting for innovative developments from SME´s, ensuring their ownerships and protecting the organisations without specific legal departments.

Public procurement opportunities

For disseminating the knowledge about IPR of retrofit technologies tendered in public procurements, the responsible Administration of the bid should ensure the property of innovative product or services which are offered in order to protect the knowledge. A set of recommendations and good practices to consider in public procurement rules can be:

- The offered innovative retrofit solution should appear in a common and official and database and the bidder must consult it for considering them correct in the process and can be valued. Data from IPR, ownership and certificate by a third party should be included.
- It would be mandatory that, in public procurement, retrofit technologies/services supplied must be included in the database.
- The scope of the database must be international or, at least, at Mediterranean level, for managing IPR in international tenders.
- Dissemination activities should be realized within the value chain in order to extend the use of tools for managing and ensuring the IPR. Public Bodies must start the initiative but have to be supported and extended by Associations of construction sector (events, forums, public presentations, etc.).

Certification Processes

Innovation actions, especially developed by SME´s, need a deep attention and resources for managing the IPR; Certification Entities and Patent Offices should provide training courses about the protection of their innovations to companies as knowledge dissemination activity.

Managing IPR needs an integral and large-scope tool regarding standardization and certification processes in order to ensure the accomplishment of regulatory framework by each agent involved in the energy efficiency refurbishment market. This Tool must be the main dissemination strategy for public procurement and has to be adapted to exploit all the recommendations for promoting the new requirements.

4.4.2. Establishing network organizations that will coordinate knowledge transfer from innovation groups and assist in implementing innovation into daily building practice

Create a virtual knowledge network that will promote bets practices in the Energy Efficiency Sector as a knowledge dissemination tools. These innovation activities must be allocated under a clear framework regarding standards, regulation, certification processes which allow to give the chance to contract by private sector with Public Bodies.

Standardization and regulation of products/services

The Virtual Knowledge Network should include different capabilities for achieving the objective of knowledge transfer regarding Standardization:

- European Commission must regulate it with the support of sectorial associations. These entities should develop the spokespeople of SME´s with the Administration.
- Common meeting point for Standardization entities, classified by scope (national and European).
- Register of Regional, National and European Regulatory framework and Standards that can affect the energy efficiency retrofitting process.
- Knowledge transfer tool for quick searching and comparisons between standardization and regulation between different rules for the same product/service.

Public procurement opportunities

The Virtual Knowledge Network must include different capabilities for achieving the objective of knowledge transfer regarding public procurement:

- The public Administration must be the promoter of this common framework at European level. The SME´s sectorial association should be the public objective for dissemination activities as providers of services.
- There must be a common site for all Public Administrations (from regional to European level) where to publish the different tenders related with energy efficiency retrofitting of buildings, specifying the contract rules, the technical conditions for developing the tendered tasks, the methodology to score the services, etc.
- The Financial Entities should establish their financial offers in order to support the investment of energy efficiency initiatives by SME´s.
- Promotion of public & private cooperation for encouragement the energy efficiency retrofitting sector.

Certification Processes

The Virtual Knowledge Network must include different capabilities for achieving the objective of knowledge transfer regarding certification processes:

- The Public Administration should be the promoter of the common network with the support of Certification and Accreditation Entities. The objective is the knowledge transfer of certification processes mainly to SME´s.
- Consultation site of certification requirements and processes for products applied in energy efficiency refurbishment of buildings.
- List of specialized certification entities in construction sector.
- List of certified products, which can be applied in energy refurbishment of buildings.

It is essential the creation of a meeting point able to coordinate and support the cooperation efforts between different agents within the value chain. This collaborative framework should be promoted by the Public Sector, ensuring the accomplishment of legislation through regulated/certified procedures and the accuracy in knowledge dissemination processes.

4.4.3. Connecting technical commercial advice to EPBD - energy performance and requirements of the actual buildings

To ensure that any commercial advice given to the end user is in line with the Energy Performance in Buildings Directive (EBPD) and national EPBD requirements. The development of knowledge dissemination activities should be promoted by Public Bodies as the main agents in charge of the regulation framework. Recommendations and guidelines for taking care of the energy refurbishment market are purposed regarding the 3 Core Issues.

Standardization and regulation of products/services

As an overall initiative, Standardization Entities must contribute to knowledge dissemination through the publishing of the different standard rules that different products/services must comply for being in line with the EPDB.

Based on this proposal, a grade of accomplishment of national EPDB requirements could be included in products/services as knowledge dissemination measure. This scale can be focused on design parameters, use, etc. during the commercialising stage. The grade of accomplishment could be established for European Directive in countries where the transposition of certain articles is not finished yet. Standardization Entities and Public Bodies should support manufacturers and products providers (especially SME´s).

Public procurement opportunities

"The products/services provided in a public tender must comply with the EPBD requirements" (European and national level); this sentence should be explicitly included in all public offers. A complementary new practical procedure should be the establishment of an additional technical requirement in public offers: The development of a report about the grade of accomplishment with the National EPDB and, in cases of non-full transposition, with the European Directive. This inform should be mandatory included in the proposals.

Certification Processes

Certification Entities should contribute to Knowledge dissemination about certification requirements providing information about the accomplishment of EPBD articles and the national transpositions of certified processes.

It is basic to transfer the level of accomplishment with EPBD, services and processes, from European to regional level. Public Bodies must establish different mechanisms to ensure the knowledge dissemination channels of commercial advices from private providers to final users and supervise the process.

4.4.4. Industry needs financial support to take up results of scientific innovation

The aim is to foster the financial support to the industry in order to market up take the scientific results into products. Funding and budget are usually made available by Public Sector in order to encourage the investment in innovation by product/services providers and manufacturers. They need to finance some activities to put them into the construction market.

Standardization and regulation of products/services

To address economic aids to standard and regulate scientific results into products: financial agents can support this initiative taking part, in a certain percentage, to the commercial benefits.

By the way, Public Bodies can destine a certain amount of funds for the standardization of products/services developed by SME´s. The Administration could recover the investment through knowledge dissemination activities by the SME´s to the rest of value chain about the standardized/regulated output.

Public procurement opportunities

The publication of public procurements consisting on provision of innovative industrial developments related to energy efficiency retrofitting for public R&D institutes, universities, etc. would imply the use of economic resources. The Public Sector could contract with providers (SME´s, mainly) which are involved in R&D activities or scientific innovation. This knowledge dissemination activity would link directly the private sector with public bodies involved in support to take up new products into the market.

Certification Processes

Financial agents can provide the financial support to certification processes. They can support this initiative taking part, in a certain percentage, to the commercial benefits of certified products/services.

Financial support to industrial sector involved in energy retrofit technologies should be promoted by Public Bodies. In this case, the Public_&_Private Cooperation through new regulations and commercial agreements would facilitate the availability of funding even its co-financing with joint exploitation of innovative products/services.

4.4.5. Occupants need financial support to invest in EE retrofitting technology

The End Users will be aware of the available financial tools that support the retrofitting techniques, and financial agents will be encouraged to develop new products. Making available funding for final users is a needed chance to promote the energy efficiency retrofitting market. The importance of disseminate knowledge about it is essential, due to the current disconnection between occupants and rest of groups within the value chain. The

targeted agents of this Knowledge Transfer Need are in charge of the establishment of knowledge transfer initiatives for achieving this goal.

Standardization and regulation of products/services

Public Bodies can provide economic aids to final users (occupants, owners, tenants) for using EE retrofitting technologies previously standardized and regulated. SME´s would be the main providers of these products/services.

Other promoters of Knowledge dissemination activities can be Financial Agents. They can provide economic aids to final users (occupants, owners, tenants) for using EE retrofitting technologies, previously standardized and regulated, and financial supported to achieve the required standards. These aids can be in line with a certain benefit of Financial Agents for the commercialization of products/services.

Public procurement opportunities

To habilitate the opportunity to consumer associations to promote energy efficiency refurbishment initiatives as knowledge dissemination:

- Public Bodies can support private initiatives from final users if they guarantee and justify the use of EE retrofitting solutions in initiatives related to refurbishment of buildings.
- Promotion of commercial development of innovative retrofit technologies through public initiatives focused on final users; Public bodies should financially support final users for testing prototypes in real conditions which can be implemented in their own buildings/houses.

Certification Processes

The knowledge dissemination about financial support to final users to invest in EE retrofit technologies should be based on certification processes directly involved in this agents of the value chain; because of that, economic aids for contracting entities which product/service (related with EE retrofitting) has been certified can be useful in order to realize this kind of initiatives. This support should be provided by Public Bodies/financial agents in terms of quality or technical requirements (guarantee of economic savings due to improvement of energy efficiency).

Financial initiatives for citizenship to invest in energy retrofit technologies should be provided by Public Bodies. Occupants, tenants and final users in general are not experts in this field. By this, the support by Public Bodies, Financial Agents and Certification Entities will be the key for knowledge dissemination. Joint cooperation, co-financing and exploitation of innovative products/services between them should be promoted.

5. CONCLUSIONS

The purpose of this work was to provide a strategy, through recommendations and guidelines for improving all phases of the knowledge transfer process (generation, sharing and dissemination) regarding standardization, public procurement and certification about energy efficiency retrofitting of buildings, in function of the main targeted agents within the value chain.

The knowledge transfer strategy is based on Knowledge Transfer Needs previously detected. Each need has been placed in the Core Issues under study. Thus, the conclusions of this report are divided into the 3 main sub-categories:

5.1. Concluding remarks about Standardization and Regulation of Products/Services

Public Bodies, as main responsible of the legal and regulatory framework, are the key agents of the value chain. Because of their own nature, they are mainly involved in knowledge generation and dissemination.

Standardization Entities must provide the technical view from knowledge transfer but should invest, beside Administration and Financial Agents, for promoting the process.

By this, it is suitable to compile the recommendations into 3 main groups:

1. **Knowledge Generation through new/specific standards and rules related with energy efficiency retrofitting**

- Standardized and regulated process (at European level) of additional knowledge generation for construction professionals.
- Creation of a European specific repository of standard and regulatory framework about EE retrofitting technologies.
- Creation of a standard to measure the grade of accomplishment of products/services with EPDB.

2. **Development of Knowledge transfer developments about Standardization (tools and initiatives)**

- Creation of a Real Test EE Laboratories where products/services can be tested under new standards and rules.
- Put forward a stock of private existing buildings where products/services can be tested in real conditions under specific standards.
- Creation of a free access Virtual Knowledge Network with that includes a database of standardized or regulated retrofit solutions, regional and national framework and ITC tools for knowledge transfer.
- Creation of an Innovation Committee formed by Public and Private Sector, as a consultant organism for regulation and standards developers.
- Periodic meetings between Public Bodies, R&D Sector and final users regarding standardization.

3. **Economic & financial support to promote knowledge transfer within the involved agents within the value chain**

- Economic support to the implementation of specific standard and rules regarding EE retrofitting and the application of innovative retrofit technologies.
- Establishment of economic aids, by public bodies, for supporting the adaptation of innovative products/services to the accomplishment of standards and regulatory framework.
- Promotion of funded projects destined to final users of buildings in order to encourage the use of retrofit products/services under standards.
- Promotion of real tests in existing buildings, with occupants and consumers, through economic incentives.
- Financial support to SME´s to the standardization of scientific advances.
- Agreements between final users/SMEs/Public Bodies and Financial Entities about ways of commercialization of standardized products/services.

5.2. Concluding Remarks about Public Procurement Opportunities

The report shows how a new category of procurement tools must emerge to meet the main changes in the European approach to innovation policy of the main changes under way in public procurement practices at the European level. The switch from a push strategy, based on supply-side policies such as R&D funding, to a pull one, based on a virtuous interplay between final users and market, should promote the adoption of public-procurement-of-innovation and pre-commercial procurement schemes as one of the main pillar of the knowledge transfer.

Obviously, Public Bodies are the most suitable agents within the value chain to improve the knowledge transfer process, especially in the generation phase, due to their competencies in the development of regulatory framework for public procurement. Laws about public Sector Contracting across Europe should be adapted for ensuring this strategy.

The report is full of recommendations and guidelines about how to modify the requirements in order to transfer the retrofit technologies into the market, put in practice by final users and how the grade of innovation must be evaluated and promoted in construction sector:

Suitable technical requirements in tenders to knowledge transfer:

- The applicants must ensure that the available staff has the required skills, competence and knowledge for the development and the execution of the work with energy efficiency criteria.
- R&D Institutions must offer technical assistance during the execution of the tendered tasks in order to add an innovative point of view.
- Design and development of part of technical requirements in public procurements by R&D technicians.
- Promotion of employment: Destination of part of the tender budget to the contracting people who can develop tasks related to energy efficiency refurbishment.
- Any product/service should be evaluated in real-life conditions before being executed in public activities.
- Creation of a Virtual Knowledge Network where can be allocated of the activities regarding knowledge transfer in public procurements.

- The applicants must develop a public report about the grade of accomplishment of the tender proposals with EPDB.

Evaluation of tenders:

- Mandatory criteria for the technical evaluation of public tenders proposals related to retrofitting of existing buildings should be set. A minimum score should be achieved.
- The list of technical requirements in all bids should consider and value the specific training of construction professionals in energy efficiency retrofitting and technologies, especially in case of certified or regulated courses by Public Bodies.
- In order to obtain a better score in the technical section of the tender through the recruitment of an independent professional, the technician must appear in a public and centralized database promoted by a public body.
- The use of innovative products/services developed by R&D Institutions o by Entities through the support or investment in R&D activities give a better score in technical requirements.
- Evaluation by R&D institutions of a specific criterion "Level of Innovation" in tender proposals, for testing the innovative character and the suitability to be chosen for the execution of the tendered tasks.

Promotion and knowledge transfer about public procurement:

- Creation of a public database of independent construction professional trained in energy efficiency refurbishment of buildings and management tool of IPR used products/services in tendered public services.
- Promotion of participation of R&D institutions in public procurement, taking part of the evaluating committee or providing support to the redaction of tender calls.
- Publication of tenders based on the implementation of R&D and innovative solutions created by private sector.
- Knowledge generation through clustering between SME´s: Organisation of events where different entities related to energy efficiency retrofitting can cooperate in order to tender jointly to public procurement.
- Promotional actions of knowledge transfer between public tenders with innovative requirements and the final users. They provide the awareness and recognition by the citizenship the efforts of public sector in energy efficiency retrofitting of buildings.
- Public procurements destined to final users for testing prototypes in real conditions that can be implemented in their own buildings/houses.

5.3. Concluding Remarks about Certification Processes

Certification and Accreditation Entities are the key agents involved in this issue. Besides, this type of organisations can be found in both sectors (public and private). By this, the sharing activities to knowledge transfer can be managed easier than in previous cases.

The recommendations and guidelines can be grouped, following the same way, in function of their effects in the knowledge transfer strategy:

New certification processes

- Creation of a Certification process of entities/technicians trained in retrofit technologies, at least in the Mediterranean Area.
- Creation, with the technical support of R&D community, of a specific ISO Norm/Quality Standard about the level of innovation in EE retrofitting or, at least, the level of innovation in existing certification processes.
- Promotion of specific calls of funded projects with the objective to develop new certification processes involved in refurbishment of buildings with energy criteria.
- Development a specific certification process with procedures on how the correct evaluation of research results can be certified in real-life conditions.
- Development of a certification process about guarantees to final users to invest in EE retrofitting technologies.

Other knowledge transfer initiatives

- Organisation of brokerage events for creating collaborative joint research activities on existing certification processes related to retrofitting topics and for cooperating with certification bodies.
- Movement of academic staff between R&D institutions and Certification/Accreditation Bodies and from R&D Institutions and Certification/Accreditation Bodies to SME´s.
- Destination of public funding to private sector in order to support certification processes of products/services related to EE retrofitting.
- European knowledge sharing of certification criteria and methods for ensuring the quality standards.
- Realization of training courses by Certification and Accreditation Entities to SME´s about protection of innovations.
- Creation of a Virtual Knowledge Network where the activities regarding knowledge transfer in certification processes can be allocated.