Deliverable 1.2
Recommendations for Community Sustainability

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Dissemination level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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1. Executive summary

The scope of the D1.2 – Recommendations for community sustainability, is to develop and provide recommendations and potential solutions to let the REViSITE community continue to be a living entity also after the project ends.

The work carried out and summarized in the following deliverable describes the overall interactions between the project and the REViSITE community. Although the work did not achieve the expected interactions, in making the community the most active possible but respecting the foreseen number of members to be achieved, some positive reactions happened within the consortium and REG activities. These activities proved the added value of having a cross sectoral expertise able to analyze, discuss and develop common solutions able to improve the impact of ICT for Energy Efficiency in the four targeted sectors by the project.

The document provides interesting results that aims to underline the need for interdisciplinary research between the four targeted sectors to avoid wasting of efforts when focusing on a single sector specific issue.

The discussions and workshops carried out also stressed the differences existing between the sectors and therefore reinforced the need of a common language to be adopted.

REViSITE developed an impact methodological assessment and a taxonomy that tried to fill such gaps since the project adopted an holistic approach that was really appreciated by experts belonging to different sectors.

Furthermore the project was able to develop successfully a common roadmap for ICT for energy efficiency that proposes common solutions for the targeted sectors. Such work has been possible thanks to the continuous discussion with a small sample of the community (represented by the REG) and with some more experts belonging to the ICT vendors industry, to Standardization Bodies and to the research industry that participated in the REViSITE workshops.

After the analysis of the overall interaction which occurred during these two years the project finalized two different recommendations for the sustainability of the community.

It has been realized that the REViSITE community will no longer survive after the end of the project unless:

- *the continuum of the community will be pushed and lead by an official institution such as the European Commission directly,*
- *the community will be aggregated in projects, of which aims and scopes are similar or compatible with the REViSITE ones.*

After the development of such recommendations, considering the work carried out within these two years by the consortium, and the high profile of members involved in the REViSITE community, the first strategy is the one that REViSITE will implement for the sustainability of its community: REViSITE will push the members of the community to actively participate in the brand new "EE collaboration Space" to provide the European ICT for Energy Efficiency sector with relevant and high quality inputs as happened within the REViSITE project

2. Abbreviations

ICT4EE	ICT for Energy Efficiency
DoW	Description of Work
ETP	European Technologies Platforms
ARTEMIS	Advanced Research & Technology for EMbedded Intelligence and Systems
ECTP	European Construction Technology Platform
RTD	Research and Technology Development
KPI	Key Performance Index
IAM	Impact Assessment Model
CW1	Community Workshop 1
VW1	Validation Workshop 1
VW2	Validation Workshop 2
BACS	Building Automation Control Systems
BEM	Building Energy Management Systems
REG	REViSITE Expet Group

3. Introduction

One of the main purpose of the REViSITE project (Roadmap Enabling Vision and Strategy for ICT enabled Energy Efficiency) is to coordinate cooperation and communication within the ICT for Energy Efficiency research community in Europe. Under the directorate of the ICT for Sustainable Growth, the COMMISSION RECOMMENDATION of 9.10.2009 on mobilising Information and Communication Technologies to facilitate transition to an energy-efficient, low carbon economy reports, in particular under the article 211 [1]:

- *It is estimated that ICT-enabled improvements in other sectors could save about 15% of total carbon emissions by 2020.18 Significant ICT-enabled energy efficiency gains are expected to be achievable in the short term in buildings and construction, in transport logistics and energy end-use.*
- *The ICT sector can deliver simulation, modelling, analysis, monitoring and visualisation tools that are vitally needed to facilitate a whole building approach to the design and operation of buildings that takes into account the many factors that influence energy demand. However investments are hampered by the absence of a sector-wide reliable and transparent means of quantifying and tracking energy and cost savings over time, which ideally would form the basis of design strategies and tools.*
- *Partnerships between sectors could accelerate the development and wide-scale roll-out of ICT-based solutions for monitoring, managing and measuring energy-use and carbon emissions in energy-using activities, thus helping to provide a reliable basis for energy-saving and emissions-reducing decisions.*
- *No single organisation or group of stakeholders can act effectively alone. Concerted action by many organisations, in both the public and private sectors, including partnerships at city and regional levels, can pioneer systemic change across society. Moreover, the Commission wishes to encourage the exchange of best practices on the use of ICT solutions to improve energy efficiency.*

In the same recommendation is, hence, suggested also that the ICT sectors '…participates, through its sector associations, in an exercise to be initiated by the EC that aims to:

- …
- *adopt and implement common methodologies to this end by 2011*
- …
- *issue a roadmap within three months of adoption of this Recommendation, thereafter annual reports*

Among this framework the REViSITE project contributed, within its activities and results, to fulfil the needs and the action required by the commission through the identification of potential common methodologies and interests for four of the ICT sectors covered within the project[1] and furthermore to initiate a not simple process related to the creation of a cross sectoral community development.

As mentioned in the DoW the REViSITE (Roadmap Enabling Vision and Strategy for ICT enabled Energy Efficiency) project coordinated cooperation and communication within the multidisciplinary ICT for Energy Efficiency research community.

[1] One of the REViSITE aim is to establish a cross-sectoral community covering Smart Building, Smart Lighting, Smart Manufacturing and Smart Grid sectors

The following figure provides an overview about the sectors REViSITE covered and investigated during its course:

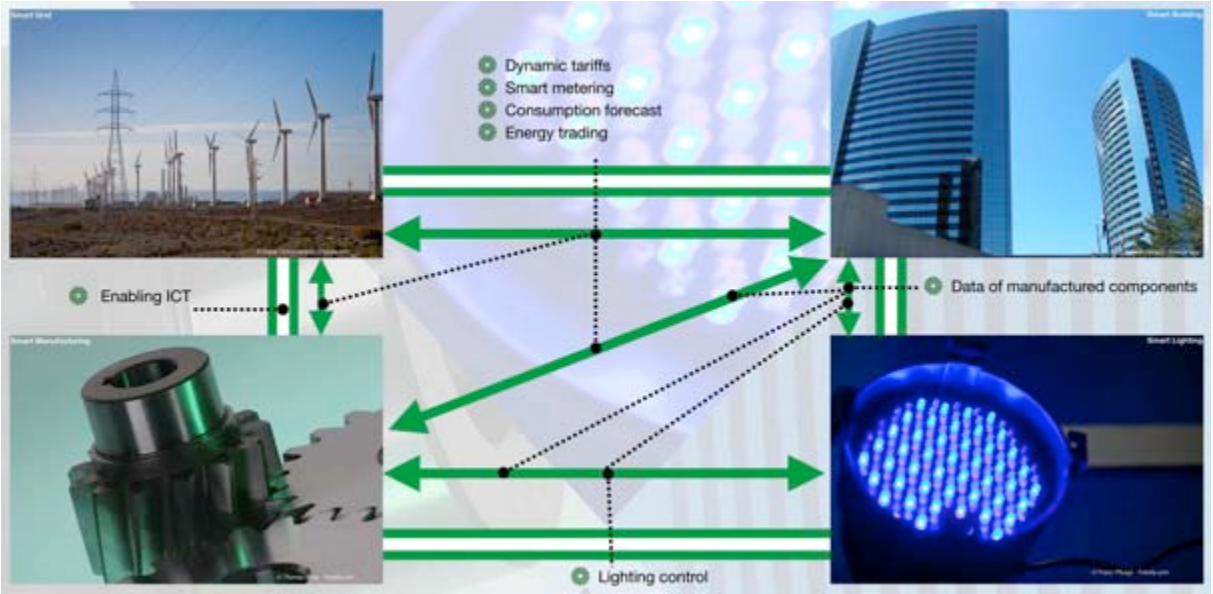


Figure 1: REViSITE covered four sectors and related links.

The development of the community behind the project foresaw the involvement and the investigation of European Technology Platforms (ETPs) representing the most the Research and Technologies Development sector specific community in Europe, specifically in these four sectors. Some of the scouted platforms are:

- *ARTEMIS*
- *ECTP*
- *MANUFUTURE*
- *PHOTONICS21*
- *SMARTGRIDS.*

Since the main objective of each of the mentioned platform is to identify and define the RTD priorities in their specific sector of expertise, REViSITE aimed to identify common and cross sectoral research priorities.

The actions undertook by REViSITE consortium lead to the identification of complementarities between the above mentioned four sectors in the area of ICT for Energy Efficiency, harmonising common RTD priorities and established a cross-sectoral community linked to all of those sectors and related ETPs.

Such community and its members, whose development was the aim of the first work package of the project, exchanged with the consortium their views and expertise in order to offer REViSITE improvement for the harmonisation of the different Strategic Research Agendas and Roadmaps.

The REViSITE community has been continuously informed about the project development, a sub-group of the community is represented by experts identified by REViSITE before the project starts, and participated more actively in the overall actions of the project. Such group has been named as the REG (REViSITE Expert Group) and participated in all the workshop organised by the consortium, addressing the project for improvement and/or assessing the work carried out so far.

Since most of the REG members, come from research institutions and industries, belonging to each of the four sectors, and most of them are also active members of the above mentioned platforms, their inputs have been really helpful and invaluable to allow the project to achieve

its results and to establish a common dialogue, made of continuous interaction, between such cross sectoral expertise.

This document is intended to analyse all the activities and interactions between the consortium and the REViSITE Community, and is to provide the more suitable recommendation for the Community Sustainability after the end of REViSITE.

The document is divided in three different parts:

- *Chapter 4, focuses on the description of the Community itself providing a brief overview about the methodology adopted, the aim of such community, its objectives and scope, and its added value to the ICT for Energy Efficiency sector.*
- *Chapter 5, focuses on the description of the various interaction between the Consortium and the REViSITE Community through the media established by the project such as: LinkedIn Group, YouTube Channel, REViSITE Website and the events organised.*
- *Chapter 6 focuses on the lessons learned so far, and develop the recommendation for the community sustainability after the end of the project.*

All consideration developed have been the results of a continuous interaction between the consortium and the community. Many of the community members were actively involved into the REViSITE activities, while the most have always been informed about the outgoing results and findings through direct contact by mail and through communication done through the website and the LinkedIn Group.
The project identified synergies between the four target sectors together with the potential interfaces and assessment of where interoperability frameworks were required and hence convergence of standards is needed.
The outcome of the Community Sustainability actions resulted in some recommendation deeply analysed at the end of this document, but mainly underlying that such community is hard to live after the end of the project, although because the response rate of most of the members has been very low during the overall project activities.

4. The REViSITE Community

The methodology used to develop such cross sectoral community has been described in the D1.1 deliverable [2], but it is recap here for the reader convenience.

The Community represents the outcome of the activities carried out by all WPs of the project, but particularly from the continuous interactions occurred between WP1 and WP4, which produced specific and targeted actions for experts involvement.

The first step carried out by the Consortium was the scouting and the exploration of the ETPs of the four sectors covered by the REViSITE consortium, in order to identify key stakeholders, and also European, National and Regional Initiatives on RTD in relation to ICT for Energy Efficiency in general.

The second step related to the definition of a Communication Protocol to be used, and the final step covered the communication actions towards the identified stakeholders.

The following picture provides a graphic overview of the process adopted to build the community.

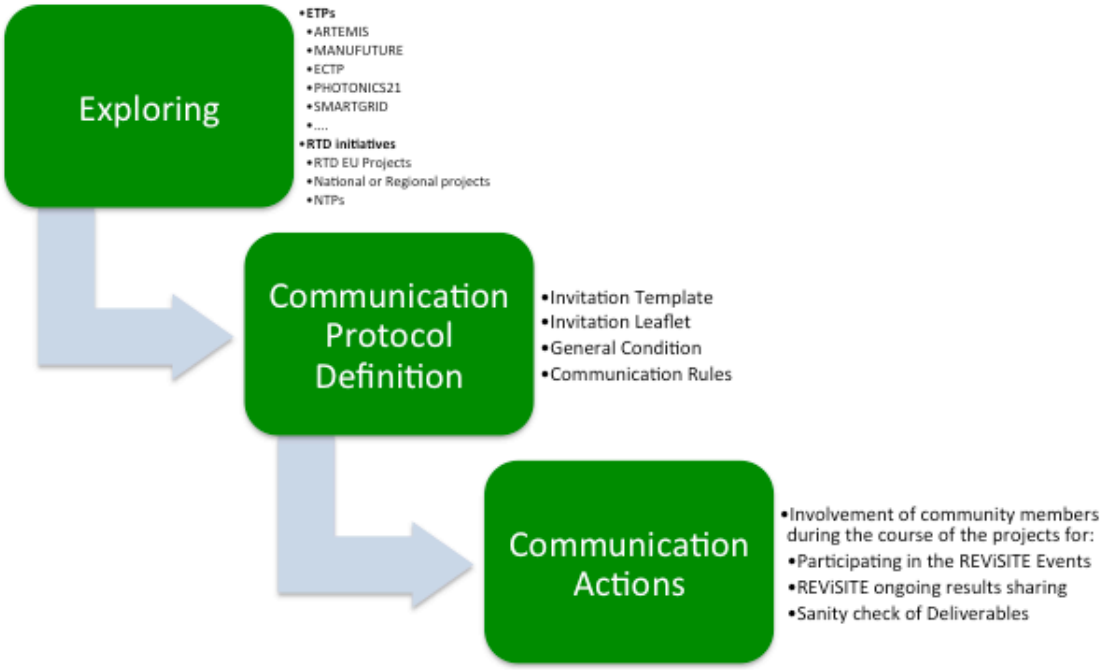


Figure 2: Process adopted for the Community Building Actions

4.1 Aim of the REViSITE Community

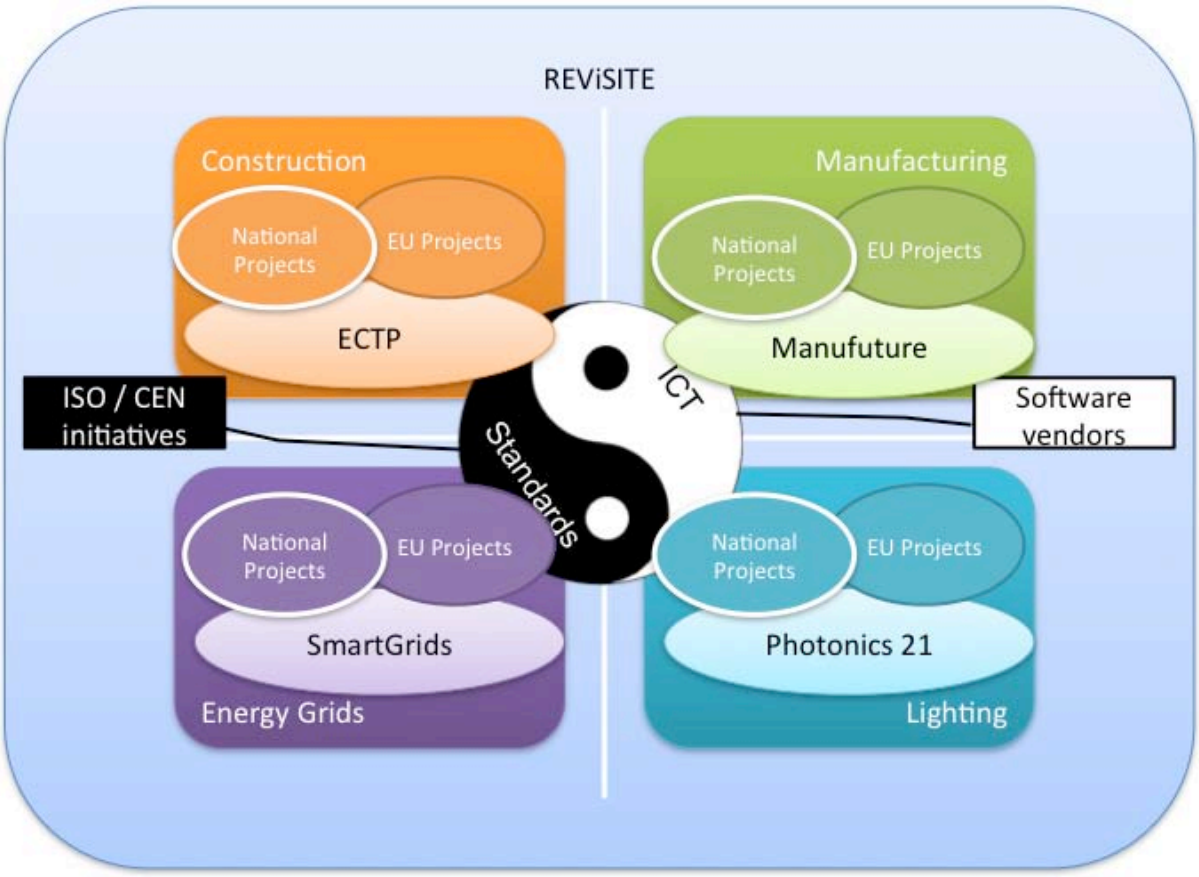
One of the aims of the REViSITE project was to put together experts coming from different sectors, but all under the common theme of ICT for Energy Efficiency, to consolidate their interactivity through 'focus groups' to be carried out during the project timeframe.

The main purpose behind the establishment of the REViSITE community was to create and lead to the sustainability of such cross-sectoral community in order to let it continue the work carried out by the project through discussions in a forum or through the identifications of new topics of common interest for the four main scouted sectors.

In synthesis the Community has been formed by members coming from the above mentioned ETPs and National / regional RTDs projects. Its nature can be seen in the following picture:

Figure 3: Community Composition

Such composition und



erlines the high level of expertise and of aggregation reached by the REViSITE community.

4.2 Objectives and scopes

One of the main purposes for the community establishment was to achieve a continuous interaction during the project with a high number of members of the community from the four main sectors that provide inputs to REViSITE to achieve its results.

The REViSITE consortium worked closely with the consolidated community developing a common, not sector specific, methodology to assess the impact of ICT on energy efficiency, and also to develop a cross-sectoral roadmap.

4.3 Composition of the Community

As far as the REViSITE project finished the Community is formed by more than 100 members, precisely 107 members. Although if the majority of them has been defined as 'quiet' members, they showed interest in being part of it, and responded positively to the consortium invitation, accepting to receive the project results and to be informed about the overall activities carried out during the two years of the project course.

After the previous two phases, the first related to the scouted ETPs in order to identify potential members and the second related to the definition of the communication protocol, the invitation was sent out to 250 experts belonging to the various ICT for Energy Efficiency movement in Europe. As mentioned previously 68 responded positively, giving a response rate of about 27%, that could be considered as a success factor considering the high level and cross-sectoral nature of the community.

Although the community has already been presented it is worth to report here a brief description to underline the quality achieved in terms of expertise aggregated.

To do so it is appropriate to show some graphics that summaries the community composition:

The following chart offers the percentage of the community composition per sectors:

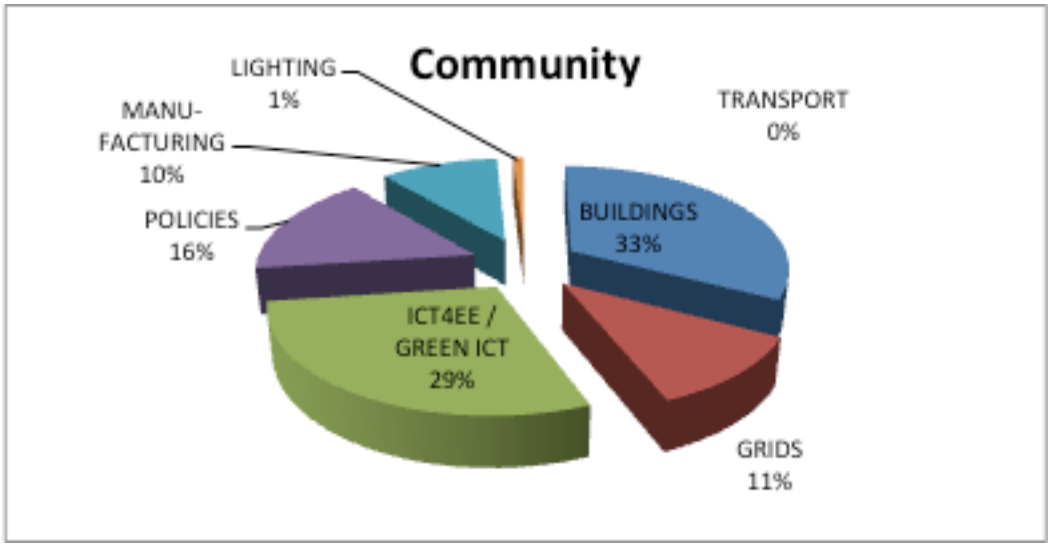


Figure 4: Community Composition per sectors

The figures mentioned above are corresponding to the "first round" which has been the result of the effort carried out in the T1.1 at the beginning of the project. But the community consolidation has been a continuous task and after this so-called "first round", new members have been added to the community and REViSITE finishes with more than 100 persons in its community.

Achieving more than 100 members the project outreached its scope in relation of the Description of Work, and mainly in relation to the nature of the members of the community.

Although some sectors have a very low percentage (the lighting one) they contributed really actively to the REViSITE work.

The cross sectoral nature of the community, proved by the above percentage, offered the project the opportunity to interact with different experts and, above all, to develop common solutions that would benefit the overall covered ICT for Energy Efficiency sectors targeted by REViSITE.

Also from a geographical point of view the nature of the community offers a global coverage, including members coming from the most of the European Countries and USA.

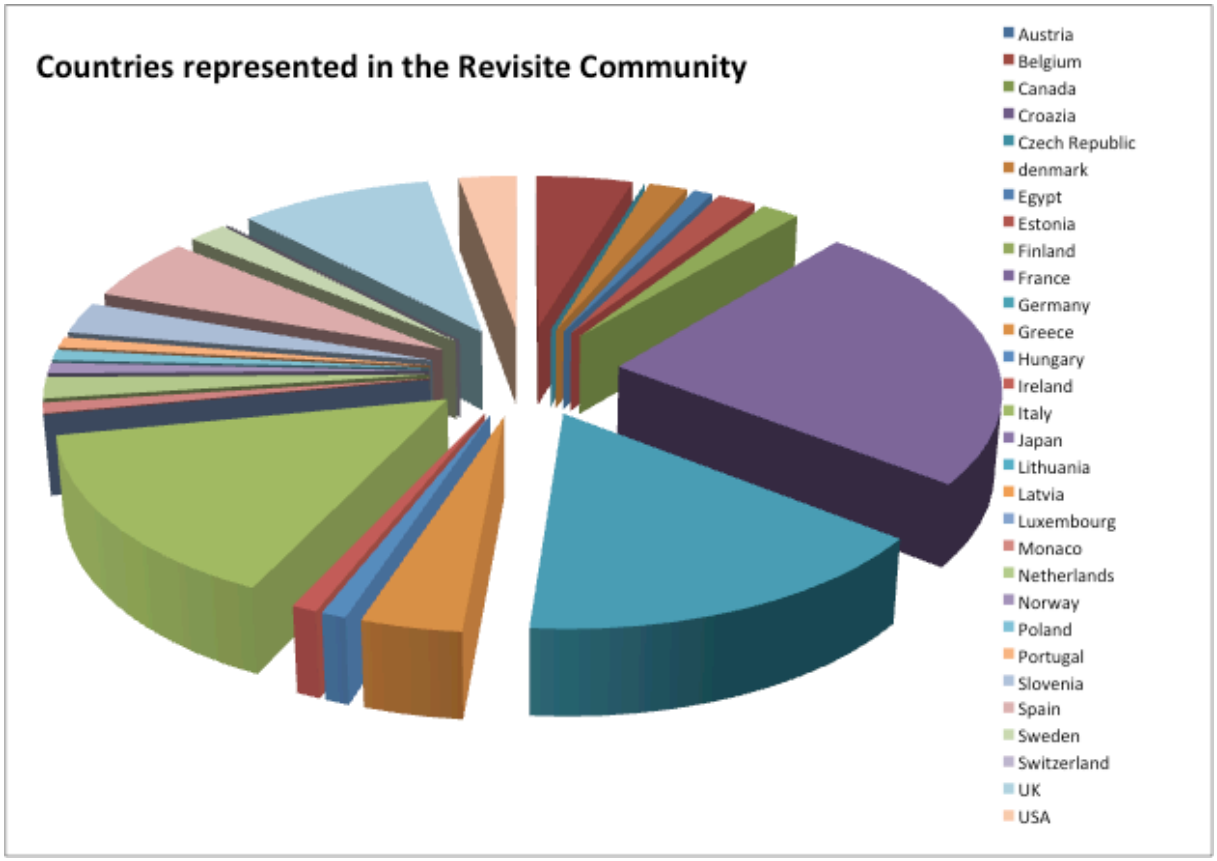


Figure 5: Countires represented in the Community

Such figures prove the high level potential of such community, that due to the short period of the project duration, did not react as were the expectation of the consortium.

4.4 The REViSITE community structures and their added value

REViSITE partners have set up two different structures in order to gather external views and feedback on the work produced.

The REG structure has been designed to closely interact via physical meetings with the consortium. This way of interacting and this structure worked well. The consortium invited as REG 20 experts along the project.

The REG was composed of five permanent members well identified since the early stage of the project proposal. The second part of the REG structure was composed of experts chosen because of their specific skills depending on the topics discussed at the different workshops. The typical REG size was around 10 persons for each of the workshops organised.

This mechanism presents at least two advantages. The first one was both to have the right competencies for each of our workshops to have fruitful exchanges and to gather added value comments. The second advantage was that these persons having physically met the consortium were more prone to follow our progress and to participate by giving feedback even if they were invited once.

The first thought when creating the REViSITE community was to have a broader audience and the consortium thought also that interactions with the community will be richer and dense. The reality has been different as few answers were received from the community (similar amount of answers to what the REG).

The high amount of positive answers received when the initial potentially interested persons were contacted confirmed that the REViSITE topic is gathering interest and willing to participate from more than the 25% of invited experts.

From this success, the consortium was initially convinced that these persons will actively contribute to our work. It has not been the case. The rate of answers received (around 10%) was in fact absolutely normal if considering that REViSITE topics were yes interesting for the whole community, but not the focus of their research or work.

Anyway, if referring to the small sample of the REG members we can state the following: if such small group of experts (around 25 during the overall work) provided a so high level input that consistently helped the project in achieving its cross sectoral results, the continuum of such community will benefit the entire ICT for Energy Efficiency Community in Europe. On the other side there should be a right motivation for such experts in continuing these activities, and such motivation can be found in the recommendations provided at the end of this document.

5. Interaction with the Community during the REViSITE Project

5.1 Media used to Interact

In the beginning the project strategy to interact with its community was based on a single direction communication flows. The production of dissemination materials for dissemination, such as the brochure and the press release represented the main means to attract experts into the community.

After the consortium decided to change strategy and to implement the use of different tools, more interactive and involving, such as the LinkedIn Group, the YouTube Channel and the Wordpress.blog.

Furthermore the project developed two different questionnaires that were sent to the community, and also to REG experts, to gather information mainly about their vision for ICT for Energy Efficiency first, and about the ICT research priorities identification and validation for the Roadmap Development after.

The following table offers an overview about the tools used during the project and the respective aim:

Media Tool	Scope	Communication Flow
REViSITE website	Disseminate and Communicate about the project and its results	One way Communication flow
REViSITE quick poll embedded into the website	Quick poll about the main barrier for interoperability and standards	Two communication flows
LinkedIn Group	Inform the LinkedIn Group members about the findings of the project. Discuss about major issues. Posting update for the REViSITE research and gather feedback	Two Communication flows
YouTube Channel	Publish videos about the project in general and about the SMARTT taxonomy produced. Publish interview of experts	One Communication flow
Wordpress.Blog	Publish news about the REViSITE events participation and project outcomes	One Communication flows
SurveyMonkey.com	Publication of two questionnaires for the development of the REViSITE SRA	Two communication flow

The last column indicates what kind of communication flow happened for each of the media adopted:

- *"One communication flow" relates mostly to activities just targeting to provide information about the outcomes or happenings in the REViSITE project.*
- *"Two communication flows" relates to bi-directional activities where inputs from the other side have been received after having initiated the dialogue on the consortium side.*

5.2 Statistics from Media Used

The following section analyses the main media used for the process of knowledge sharing adopted by the project. The three media analysed are: the website, the LinkedIn Group and the YouTube channel.

5.2.1 REViSITE Website Statistics

The REViSITE website represented the main means of communication towards the external ICT for energy efficiency community. The website has also been revamped during the course of the project, as the dissemination strategy, in order to push towards a more interactive environment the overall project and its community. It has been redesigned accordingly following the recommendations of the review meeting in Brussels. More interactivity was provided embedding among the website the tools previously mentioned and that offered the opportunity to the visitor to gather information about the project from different sources (e. g. LinkedIn, YouTube, etc.) and also provides inputs to the project itself (quick poll embedded, the surveymonkey questionnaire).

This paragraph focuses on the statistics of the website from the beginning of the project until the end.

The first statistic that is following shows the numbers of unique visitors monthly:

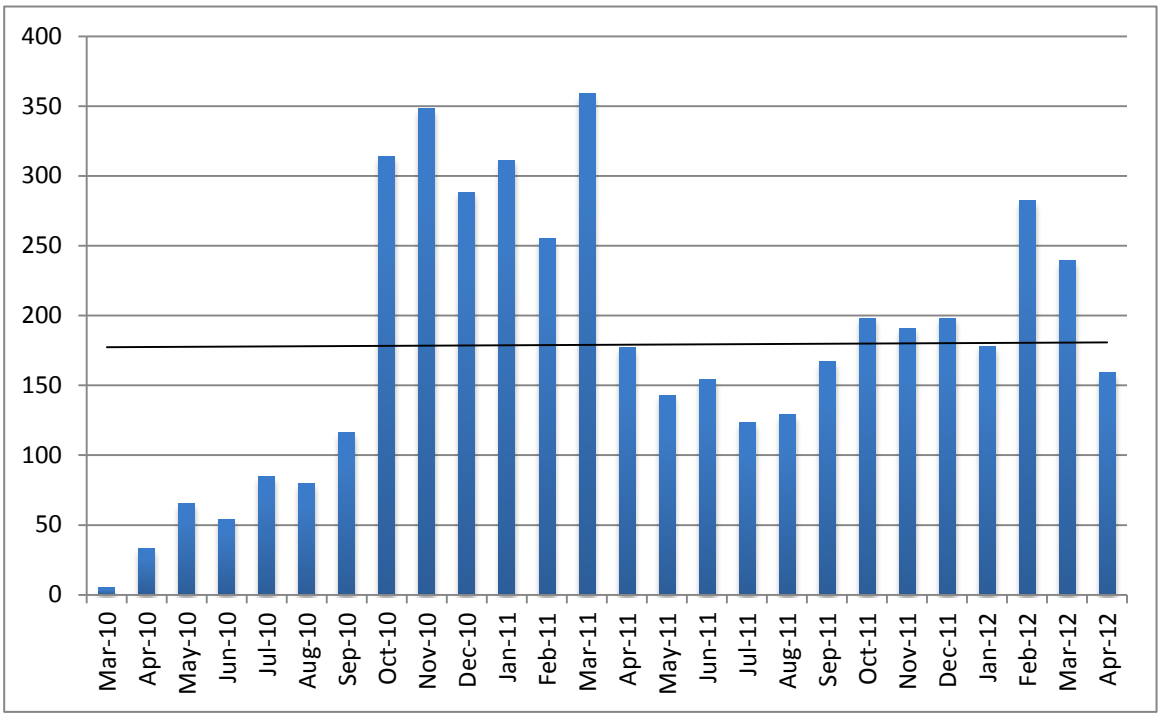


Figure 6: REViSITE Website Unique Visitors

The median of such unique visitors is 172 unique visitors per month. Such number is quite high, considered the scope of the REViSITE project,that targets the ICT for Energy Efficiency sector, hence it refers to a specific and high level niche of the overall ICT sector. As per the unique visitors also the number of visits has a high average, such number is 309 visits.

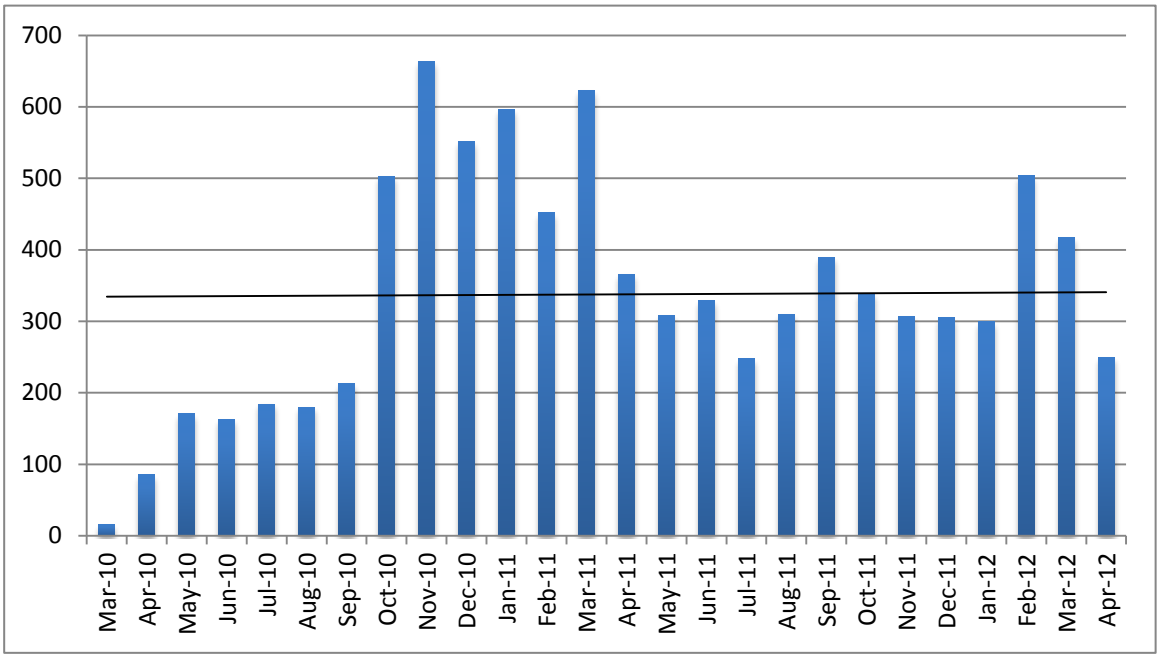


Figure 7: REViSITE website number of visit per month

The next statistic is related to the visits per visitor. Such statistic is consistent if it is above 1, such value indicates that people come back to the site. The following graph indicates that the REViSITE website maintained a median of 1.915, hence it means that the media of visits is about two visits per single user.

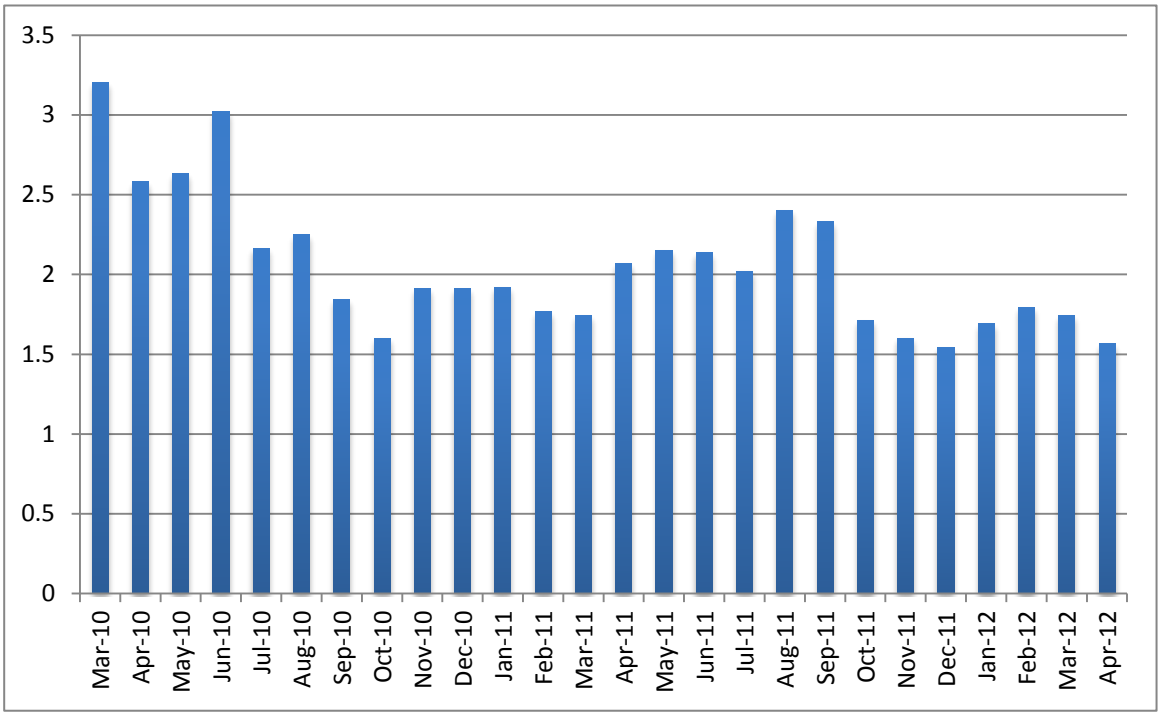


Figure 8: Visits per Visitor

5.2.2 REViSITE LinkedIn Group Statistics

The LinkedIn group saw the participation of 44 members.

Their level of seniority is the 43% holding a senior position in their respective jobs, the 13% a Manager Position such as the Director Position, the 11% an entry level position and the 6% a Vice President Position.

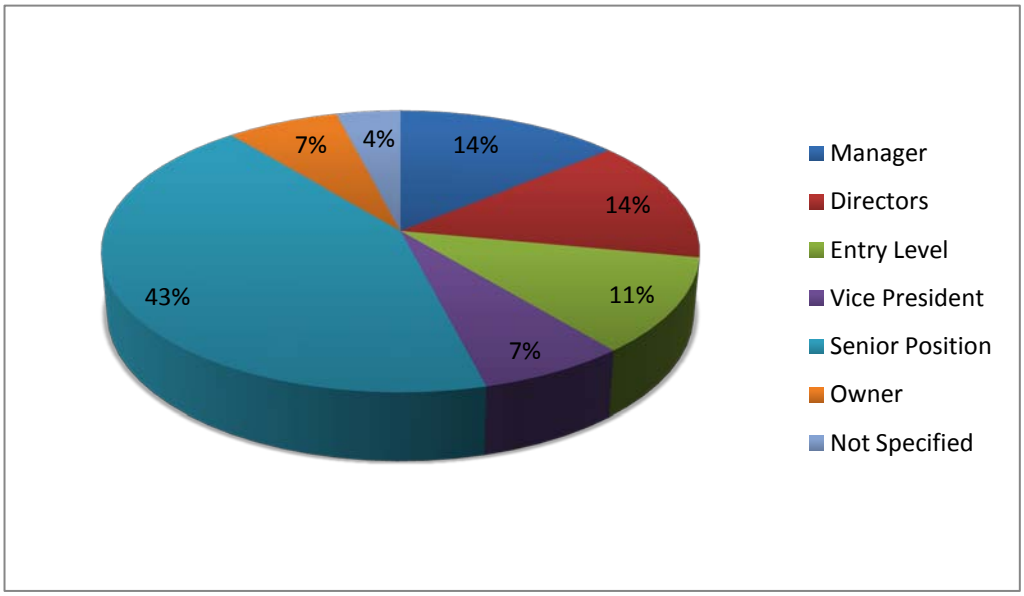


Figure 9: Seniority Level for LinkedIn Group Members.

While the functions covered by such members are: the 23% of them are Programs and Project Managers, the 14% is working in the research, the 14% are engineers, the 11% works in the consultancy sector, the 7% in Education and the other 7% in the Business Development.

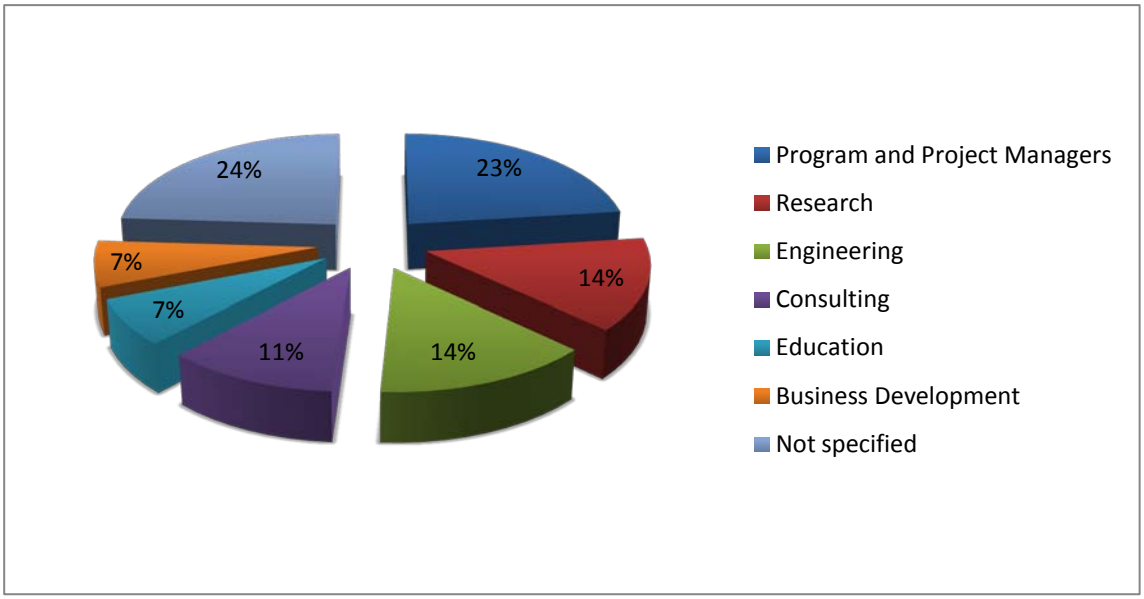


Figure 10: Functions of the LinkedIn Group members.

The group is formed by a multitude of industries all relevant for the overall ICT for Energy Efficiency. In the specific the 23% belongs to the Information Technology and Services, the 16% belongs to the research, the 9% to the Oil and Energy Industry, the 5% to the Renewables & Environment, the other 10% is equally divided between Computer Software industry and Higher Education Industry. The following figure offers a graphical visualisation:

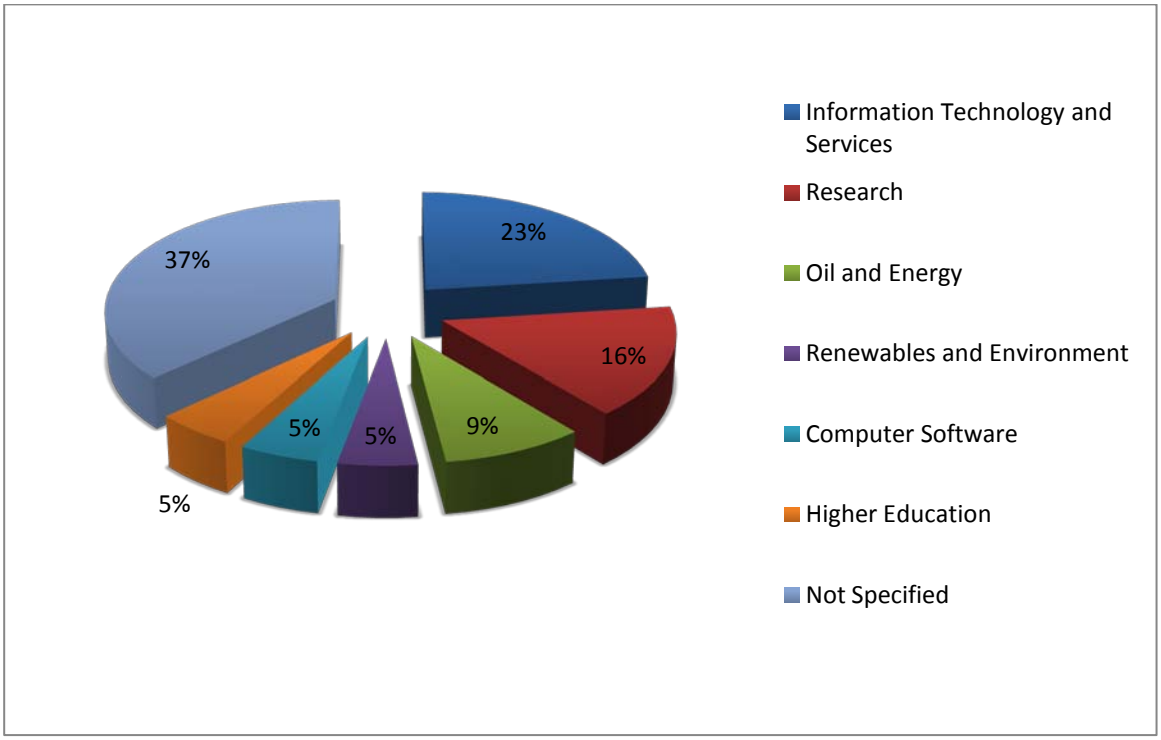


Figure 11: Industrial sector represented.

From a geographical location only the 42% indicated their geographical area: the 9% from France, 14% from Netherlands, 7% from United Kingdom, 7% from Spain, and 5% from Italy.

The growth of the group is indicated in the following graph:

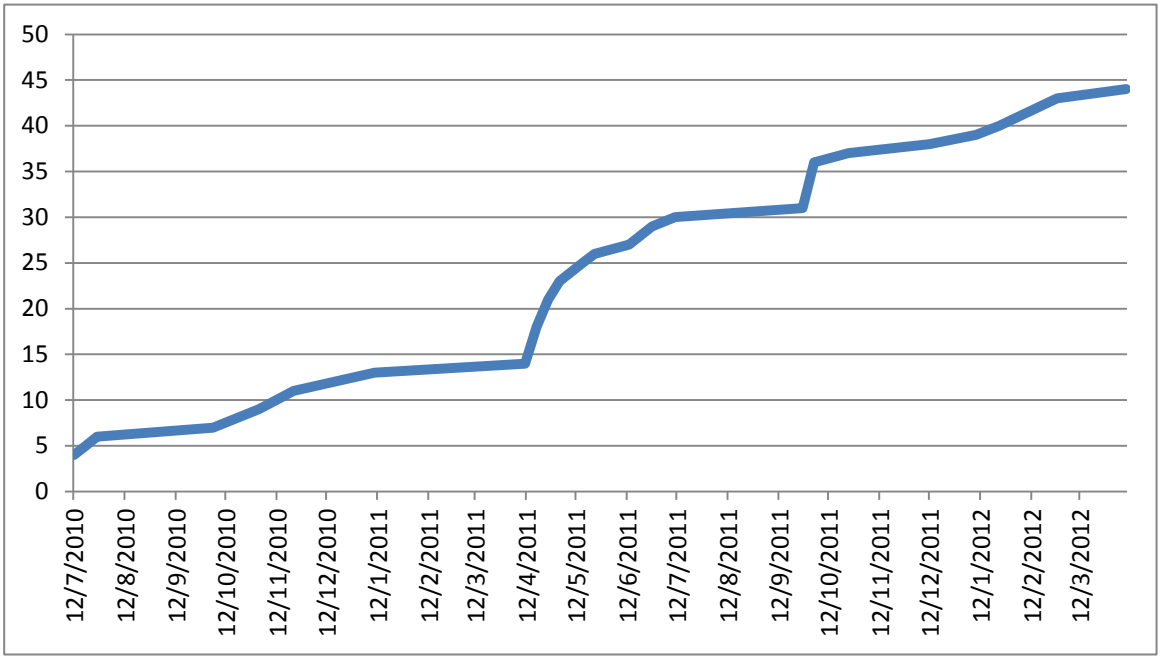


Figure 12: Growth Trend

While the following graph offers an overview about the interaction among the LinkedIn Group:

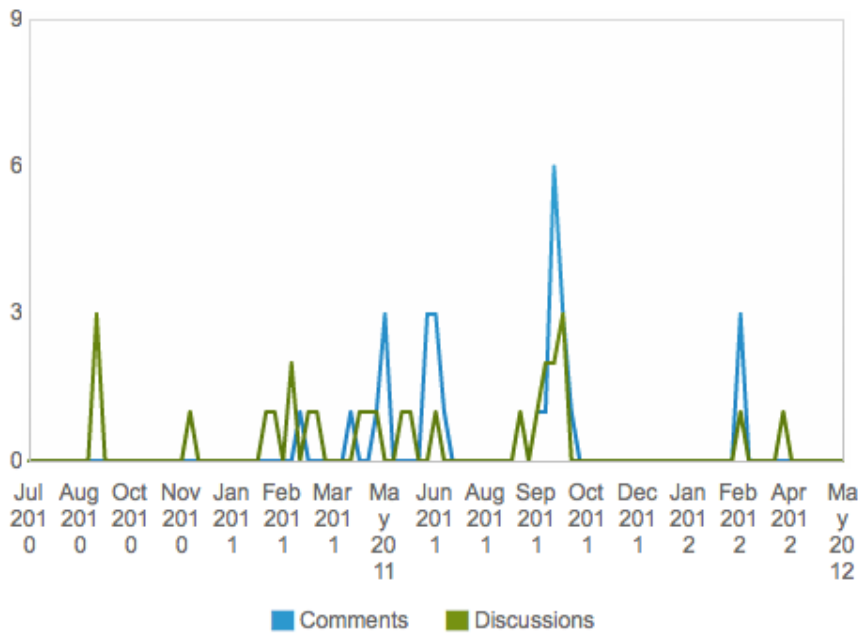


Figure 13: Discussion and Comments performed by the LinkedIn Group

Although if the quantity of interactions between the LinkedIn members has not been so high in quantity, all the discussion performed were of high level of expertise and provided the consortium with useful inputs to be considered during the project work.

The consortium pushed for discussion on such channels but almost all LinkedIn members they were not so active as our expectations. Nevertheless the few discussions provided, as mentioned, the consortium with high level views and with some inputs related to issues such as the roadmap development and the recommendations for standards developed by the project.

5.2.3 REViSITE YouTube Channel Statistics

The YouTube channel[2] represented one windows on the entire ICT for Energy Efficiency community for the REViSITE project.

The channel was used to publish videos related to:

- *General presentation of the project scopes and aims*
- *Explanation of the REViSITE framework and SMARTT taxonomy developed during the project*
- *Interview to experts developed during the REViSITE workshops and also remotely to gather feedback about the project in general and about key issues for interoperability and standards*

The total number of videos developed and uploaded on the channel is 15, of which:

- *1 related to the general presentation*
- *1 related to the REViSITE framework and SMARTT taxonomy*
- *1 interview carried out by Skype for inspection about interoperability and standards issues between the four sectors*
- *1 general video related to the Arnhem workshop*

[2] The web address of the YouTube channel is: www.youtube.com/revisite.

- *1 interview made in Nice during the ICT for Sustainable Home Conference in November 2011*
- *1 video related to the workshop organised by REViSITE during the EUSEW in April 2011*
- *9 video related to interviews to REG members participating in Arnhem workshop in June 2011.*

The overall channel gathered 832 video visualisations, and only the video entitled 'Introducing REViSITE' – the general project description – has been viewed for 145 times followed by the video 'The REViSITE Framework' viewed for 106 times and the video related to the REViSITE workshop in Brussels during the EUSEW watched for 93 times.

Such numbers are quite satisfactory, considering the nature of the content of videos and the high qualitative and specific nature of the entire project.

5.3 Inputs from the Community to the REViSITE Project

5.3.1 First Questionnaire: the REViSITE framework Development

The first questionnaire developed by the consortium and that targeted the REG, was developed during the beginning of the 2011, after the second REViSITE workshop organised by the consortium in Helsinki. The scope of the questionnaire was to gather, suggestions on how to improve the performance of the workshop itself – if any – and particularly to gather from them:

- *Inputs about the ICTs technologies that needed to be identified per each of the SMARTT taxonomy categories and that have the greatest potential impact on ICT for Energy Efficiency within the European Union,*
- *Inputs about the ICTs that can be used across the four targeted sectors to improve the Energy Efficiency, and*
- *Their vision of ICT for Energy Efficiency and its alignment with SMARTT taxonomy.*

Such results offered high level and cross sectoral inputs for the on-going REViSITE work about the IAM and the SMARTT taxonomy, and also suggestions on improvement about the workshop organisation.

The questionnaire was presented to the REG members through the use of the surveymonkey platform that allowed them to fill it directly online, and allowed the consortium to check and gather results directly from the web.

5.3.2 Second Questionnaire: The REViSITE Roadmap Development

The second questionnaire used by the project, was more complex than the previous one.

It has been developed during the second period of the project and was targeted to a larger audience of experts.

The topics covered by such questionnaire focused on the work carried out by the consortium about the REViSITE roadmap development, and hence related to the assessment and sanity check of the ICTs technologies identified and proposed as cross-sectoral solutions for the REViSITE Strategic Research Agenda, the Implementation Action Plan, and the Recommendation for Standardisation Solutions.[3]

The same questionnaire was developed in different versions and in different , and customised for different target audiences with respect to their expertise.

A first version of the questionnaire was submitted during the ECTP Conference in Warsaw, the ICT for Sustainable Home in Nice and the CIB Conference in Sophia Antipolis. This version focused more on the investigation about the ICTs that could be potentially impacting interoperability and standards between the building sector and the grids.

A similar questionnaire was then developed in order to target a more general audience for ICT for Energy Efficiency and was uploaded online in the surveymonkey platform targeting the four sectors in general. The link to the questionnaire was then sent to all the community members, and posted in several thematic LinkedIn group.

[3] The three topics mentioned represents the REViSITE Roadmap.

The response rate was really below our expectative but considered the high qualitative level of respondents, and the specific topic, the whole consortium felt satisfied with such results gathered. The analysis of such questionnaire is reported into the Appendix III.

Another version of the same questionnaire was developed and attached to the consultation version of the D3.2 specifically related to the REViSITE Roadmap, it is reported in appendix IV while its results are reported in Appendix V.

5.4 Discussion and feedback from REG

The most active sample of the total population of the community can be targeted in the REG members who participated into our workshops and supported REViSITE for the entire duration of the project, from their first involvement till the last workshop organised by the consortium in Paris.

Their collaboration with the consortium proved the interest of such experts in the project activities and also the respective interactions between experts belonging to the different four sectors.

Although the process of making such experts interact reciprocally took a little bit of time, in the last three workshops organised, during the brainstorming exercise, most of them discussed common solutions. Such achievement was also pushed by the SMARTT taxonomy produced by REViSITE that offered them a common language and a common view about the ICTs for energy Efficiency.

The following paragraphs synthesizes the inputs gathered from the REG members during the various key topic issues discussed during the REViSITE workshops.

5.4.1 About the REViSITE taxonomy and impact assessment methodology

The SMARTT taxonomy and the Impact Assessment Methodology development phase comprised most of the work carried out by REViSITE during the first year. The workshops organised for the development and assessment of the work carried out were organised and held in Sophia Antipolis, June 2010, and Helsinki, January 2011.

Basically the REG showed their positive opinions about the methodology proposed by the REViSITE project; indeed the use of this strategy looked innovative to their point of view, and appeared to be suitable for REViSITE's aim. The discussions during the workshop emphasised the importance of defining both a suitable ICT4EE taxonomy and the implementation of the impact assessment model, which will require accurate information. Two main issues to be considered:

- *there is a general consensus on the challenging aspect in evaluating the four ICT4EE sectors as a whole, in particular for smart manufacturing that does not present characteristics to be easily compared with the other ones*
- *the REG answered positively to the S.M.A.R.T. methodological approach that seems to be almost coherent and bringing added value to the sector; moreover we can review and build on several works in this area*

Such inputs gave strength to the consortium to proceed on the already outlined way.

5.4.2 About the REViSITE Roadmap

The roadmap workshops developed by the consortium were carried out during the second period of the project. The first one took place in Arnhem in June 2011 and the second one in Paris during March 2012-06-01.

After the Arnhem workshop, the REG provided very important consideration about the strategy implemented by REViSITE to carry out the work of developing its roadmap. Some of the comments and observations obtained from the participants were:

- *"Need for moving to cognitive analysis phase to have a better understanding of the behaviour of operators and manufacturers and knowledge about it for the design processes."*
- *"The day workshop was very productive, especially between the building and the manufacturing sectors. It offered the opportunity to identify common problematic and, more important, also common potential solutions easily identifiable through the use of the SMARTT taxonomy developed by REViSITE".*
- *"For me the question is if there is any research needed... There are a lot of algorithms that only needed to be translated into various other sectors. It is specific to the application of that part of the process you are considering to see where the big gaps are. The day was challenging and very fruitful."*

Such comments enhanced three main factors:

- The need for taking into consideration the final user point of view in almost all the ICT for Energy Efficiency research topic
- The interaction developed between two or more sectors can lead to common and high level impact ICTs solutions, and
- The interoperability of solution has to be adopted by most of the sectors.

5.4.3 About the overall project

During the project, and particularly during each of the workshops organised, the consortium continuously asked about feedback inherent to the overall project work, about the overall organisation of workshops and about the developed strategies for the on-going REViSITE development.

Most of the comments were gathered and reported in the various deliverables related to the workshop description, and in particular in the D4.3.1 a/b/c/d [5,6,7,8].

For the reader reference we report here the main comments in chronological order to show the improvements of the project in accordance of feedback received and interaction occurred:

- *First workshop feedback (CW1): the overall feedback received by community participants (REG) were extremely positive in regards of the organization, the given instruction, the location, the agenda, the related workshop objectives achieved, the schedule and timing and about the clarity of presentation given to the audience by the consortium. The suggestion of brainstorming exercise development was provided.*
- *Second Workshop feedback (VW1): participants suggested to distribute documents developed previously in time of the work day, add a summary page for each of the deliverable developed, Consider more time for the brainstorming session and provide more detailed expectation to the REG.*
- *Third Workshop feedback (VW2): the discussions developed, during the overall day and after the brainstorming exercises, strengthened the already well-developed foundation of the project and provided the consortium with clear directions for the future works in respect of the REViSITE roadmap development, offering high level of details concerning both the research priorities that will impact the most in the upcoming years and the drivers and barriers to be faced commonly in ICT for Energy Efficiency.*
- *Fourth and Final Workshop (VW3): The overall assessment of the REViSITE project was positive from all the audience. Basically experts recognised the*

need for what REViSITE is producing, a common language and methodology that enables the four specific sectors for an easier communication mean.

Such suggestions provided helped the consortium in preparing more productive workshops that ended up with a positive final response from the community participating in the final one held in Paris and described in detail within the Deliverable D4.3.1d.

6. Assessment and recommendations for Community Sustainability

6.1 Assessment Methodology (KPI)

In order to assess and, consequently being able to formulate the due recommendation for the community, the consortium established a list of indicators which performance has been analysed.

Such Key Performance Indexes (KPIs) have been based on two main categories:

- *Quantitative*
- *Qualitative*

The first category, the quantitative one, is based on numbers the consortium has been able to define in the course of its actions. The KPIs comprised in this category are:

- *Number of Community Members, divided per their belonging structure (R&D Centres, Universities, Kind of Industry, Local Policy makers, Governmental Institutions, Agencies) and per their geographic location*
- *Number of Communication sent to the Community and their response rate*

The second category is more focused on the qualitative aspects of the members of the community. Some of the KPIs included in this category are:

- *Diversity of ICT4EE subsectors represented by the community members (to prove the cross sectoral nature of the REViSITE Community)*
- *The fact that key actors of the different ETPs are members of the Community. This is of particular importance as these persons may act as relay for our work towards their respective ETP's communities.*

6.2 Evaluation of the REViSITE Community

In order to give an evaluation of the community it is worth to mention some numbers about the community consistency in terms of numbers of members, expertise and geographical locations, and after proceed with the community assessment and evaluation.

The following figure, from the DoW, indicates the REViSITE scope in building a cross sectoral community:

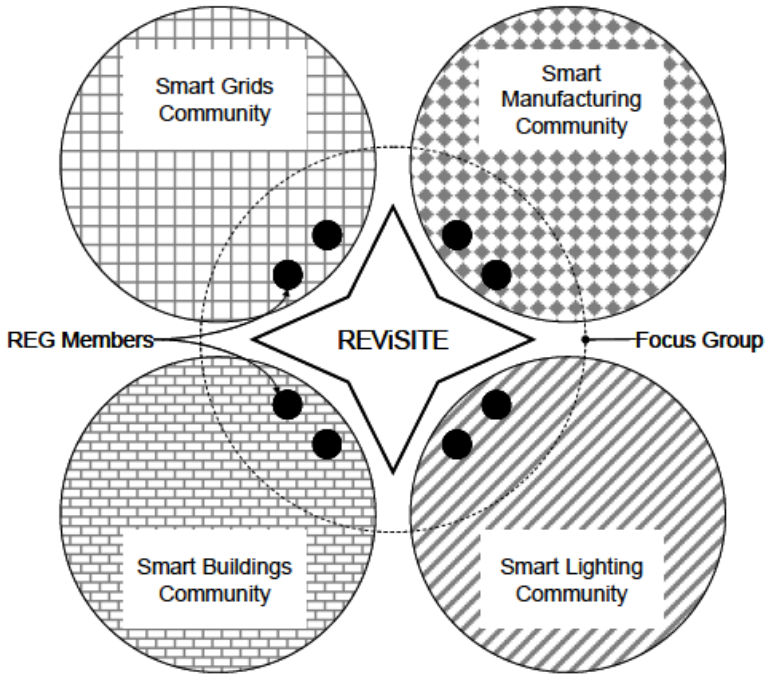


Figure 14: REViSITE Communities topology

In respect of what was foreseen by the project the community respected the characteristics the consortium wanted to achieve.

There are members of the community that are active in the respective ETPs, and/ or active in relevant research projects that are related to the topics tackled by REViSITE.

The people that accepted to be part of the community, and mainly those who accepted of being part of the REG members, shared outcome of the REViSITE project within their own activities, would it be ETPs or a research project where they are involved.

REViSITE has been able to involve experts that will act as ambassadors of the REViSITE outcomes towards their belonging groups, hence will promote the REViSITE solution that can be taken into account by technical experts belonging to one of the four scouted sectors of the project.

6.3 Recommendation for the Sustainability of the REViSITE Community

The notions of Community and living Community are two different concepts. During the project, the consortium gathered several emails after a desk-based study of existing initiatives (ETPs / European and National projects, etc.). This study allows gathering approximately 250 emails of relevant persons / experts in domains related to the REViSITE objective. The other way that has allowed REViSITE to augment its community has been physical meetings of persons during conferences, workshops or the other targeted events listed in the D4.2.2b.

At the end, the community was composed of approximately one hundred experts. Approximately half of these experts were contacted via the desk based study and the other half from various peer to peer exchanges that consortium partners have had along the project duration. But during the different phases of interaction with this community, the number of

feedback (number of questionnaires returned for instance) has been very low. Even if the members of the community were all interested and volunteer, it has been at the end very difficult to obtain reactions from them.

May be this was an 'utopia' and very ambitious to have such community involved and committed to collaborate on REViSITE work.

If a project is looking for continuous interactions with a set of experts having an external view on the progress and outcomes of a project, it appears from the REViSITE experience that smaller group of experts could be the right size and the appropriate solution. The REViSITE Expert Group (REG) has been the right example of a continuous feedback and support.

The way the REG interaction was organised may also be responsible for this success. The initial idea of the REG was to create a reduced group of experts, external to the project that will be invited on a regular basis to help the consortium in elaborating its Vision, Strategic Research Agenda and Roadmap. This group of ten persons was composed of a kernel of five permanent members plus five additional non permanent members invited according to the specificity of each workshop.

This configuration worked well as we enrolled in this group around 20 different experts that have contributed to give back critical views on methods used and results obtained by the consortium all along the project duration. Having each time a mix (or a balance) between permanent experts and new comers allowed smooth and efficient discussions without for instance the need of re-doing / re explaining the project all the time to each expert.

This flexible approach in the composition of the REG for each workshop helped also to have the "right REG" for the right workshop. For the first workshops for instance, experts were coming from the four sectors mainly and for the last one, the final REViSITE workshop, the REG was composed of experts belonging to the software domain, the standardisation domains and the Energy Domain, which was each time well suited to the main topics discussed during each workshop.

From the results obtained during the course of the project in relation to the Community activities, the recommendation for a sustainability strategy for the community developed can be split into two macro strategies:

- *The lead of the REViSITE community will be taken by an official Institution such as the European Commission,*
- *The community members will be addressed or redirected to other European initiatives with similar scopes and aims such as the REViSITE ones.*

Such strategies come out after the consideration provided within this documents and following the response rate of interactions between the Consortium and the Community.

In respect to the first recommendation, the figure of an important institution such as the European Commission could provide the members of the Community with more incentive in participating in such cross sectoral activities. Most of the members who accepted to be part of the community, after their first interest in the research carried out by REViSITE, never showed an active interest. Under the umbrella of some more important and influential leader, the possibility of a more proactive interactions between the members would take place. To mention some activities that are living with a similar scheme is worth to refer to the eeBDM initiative that under the umbrella of the EC is developing continuous brainstorming initiatives and an active forum.

In respect to the second recommendation, related to address the community towards similar initiatives, the consortium identified three potential initiatives. Such initiatives are:

- *ODYSSEUS*
- *IREEN*
- *MIRABEL*

The following table clarifies the reason for such choices underlining the similarities between REVISITE and each of the above mentioned initiative, while a more detailed description is provided in Appendix VI.

Projects		Note
REViSITE	ODYSSEUS	Interoperability between two or more ICT for Energy Efficiency Sectors (Building, Grids, Lighting, Manufacturing). ODYSSEUS is dealing with BEMS, BACS
REViSITE	IREEN	Roadmap development for neighbourhoods, from a construction point of view.
REViSITE	MIRABEL	Mirabel is in the addressed scope by REViSITE because is dealing with the distributed energies and provide answers that allow to balance the GRID with the distributed demands and production

Both strategies could provide the community with a continuum after the end of the project, although, considering the work carried out during these two years, and the profile of the community members, the first strategy looks more appropriate than the second.

As conclusion, the consortium, will push the members of the community to actively participate in the brand new "EE collaboration Space" in order to follow the first of the two strategies developed and to provide the European ICT for Energy Efficiency with relevant and high quality inputs as happened within the REViSITE project.

7. References

- *Recommendation [C(2009) 7604], 09/10/2009, on "Mobilising Information and Communication Technologies to facilitate the transition to an energy-efficient, low-carbon economy"*

[1] REViSITE Consortium, “Project Handbook”, latest release 5th May 2010

[2] REViSITE Deliverable D4.2-1 “Preliminary Communication and dissemination plan”, released the 24th May 2010

[3] REViSITE Deliverable D1.1 “Consolidated Community report” released the 30th September 2010

[4] REViSITE Deliverable D4.3-1a “International workshop report 1: Community and ICT impact” released the 31st July 2010

[5] REViSITE Deliverable D4.3-1b “International workshop report 2: Vision validation” released the 17th March 2010.

[6] REViSITE Deliverable D4.3-1c “International Workshop report 3: SRA Validation Workshop” released the 30th June 2011

[7] REViSITE Deliverable D4.3-1d “IAP Validation Workshop: ICT for Energy Efficiency – Cross-Sectoral Interoperability Workshop”, released the 26th April 2012

8. Appendices

Appendix I: First Questionnaire: REViSITE Validation Workshop

REViSITE Validation Workshop

Exit this survey

4. Section 4 – Workshop evaluation

REViSITE

1. Please provide us feedback, comments and suggestions for future better workshop organisation

Prev Done

REViSITE Validation Workshop

Exit this survey

2. Section 2 – ICT4EE

List specifically for each main category of the SMARTT taxonomy below 2 or 3 ICTs you see as having the greatest potential impact on EE within the EU. Where possible please elaborate on your choice.

1. Specification & Design

ICT n.1

ICT n.2

ICT n.3

2. Materialisation (as per REViSITE definition)

ICT n.1

ICT n.2

ICT n.3

3. Automation & operations decision support

ICT n.1

ICT n.2

ICT n.3

4. Resource and process management

ICT n.1

ICT n.2

ICT n.3

5. Technical integration

ICT n.1

ICT n.2

ICT n.3

6. Trading & Transactional management

ICT n.1

ICT n.2

ICT n.3

7. In your view, what are the ICTs which can be used across the four target sectors to improve energy efficiency?

Prev Next

REViSITE Validation Workshop

Exit this survey

3. Section 3 – REViSITE Vision

REViSITE

1. In one or two sentences describe your vision for ICT4EE

2. Please describe (if applicable) how your vision aligns to any of the SMARTT taxonomy categories

1 Specification & Design	
2. Materialisation (as per REViSITE definition)	
3. Automation & operational decision support	
4. Resource and process management	
5. Technical integration	
6. Trading & Transactional management	

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REViSITE Validation Workshop

Exit this survey

4. Section 4 – Workshop evaluation

REViSITE

1. Please provide us feedback, comments and suggestions for future better workshop organisation

Prev Done

Appendix II: Second Questionnaire

REViSITE

Prioritization of Research & Development Topics

REViSITE invites you to help shape the future ICT4EE research agenda

REViSITE – Roadmap Enabling Vision and Strategy for ICT-Enabled Energy Efficiency is a coordination action set up by the European Commission to identify cross-sectoral research priorities covering the domains of smart grids, manufacturing, buildings and lighting, in the area of ICT for Energy Efficiency (ICT4EE).

REViSITE invites you to shape a Strategic Research Agenda that will influence future EC Framework Programs and funding by taking the time to complete this survey, which should take approx 15 minutes to complete.

Please note - while it is recognised that in many situations - economic, social and political issues or sector specific non-ICT technologies can offer great significance in terms of enabling energy efficiency, the focus here is on Information and Communication Technologies or ICT related Research in Technological Developments [RTDs] that have the potential to enable energy efficiency or reduce energy consumption in the above mentioned four sectors.

In responding, you will have the opportunity to indicate your level of expertise in each subject area. All results will be made public on the REViSITE website.

Thank you

The revisite.eu Consortium

1. What is your first name?

2. What is your last name?

3. Please indicate your Organization's Name

4. Please insert your email address

5. Which stakeholder class do you represent?

- Building Client / Owner / Developer / housing orgnisation
- Designer (AEC)
- Project Manager (consultant)
- Construction Company / Subcontractor (buildings, building services systems)
- Supplier (material / product)
- Manufacturer (material / component, system)
- Building automation company (manufacturer / constructor / system integrator)
- Building Operator / facility manager
- Building Occupant
- Public authority (for Buildings)
- ICT provider / developer
- Energy Utility
- Research Institute / University / Research Funding Organisation
- Financial Organisation / Business Developer
- Other (please specify)

6. Your main area(s) of expertise

- Building Design
- Construction / Renovation
- Building Materials / Components
- Building use / operation / monitoring / maintenance
- Building automation / Electrical Building Services
- Energy Management at building / district level
- ICT Software / services
- R&D
- Other (please specify)

Next

REViSITE

Prioritization of Research & Development Topics

Data models, Interoperability & Standards

For the following categories please indicate the priority for the research topic, the relevant standardization body and the time when the research results are expected to be available for industrial use

7. Please indicate your level of expertise in Data Models, Interoperability & Standards

○ Low ○ Medium ○ High

8. BIM – Building Information models (design stage)

	Priority	Time	Related Standard body
Enhancement of BIM with energy-related data (coverage of energy related information needed & provided by various disciplines).			
Interoperability between BIM-based design, analysis, and planning tools (availability of necessary data from BIM for various application tools).			
Interoperability between BIM and assessment & simulation tools (availability of necessary data from BIM for static & dynamic energy performance estimation).			
Interoperability of reference data (e.g. catalogues of materials, products, best practices) with BIM.			
Harmonisation of building regulations with BIM (availability of necessary data from BIM for assessing compliance).			
Harmonisation of design and construction standards with BIM and related process definitions.			
Interoperability of BIM with collaborative working environments (metadata, semantic mapping).			
Interoperability between BIM and visualisation & decision support (availability of necessary data from BIM).			
Interoperability of BIM and GIS (urban plans, infrastructure networks, local energy-related services etc.)			

Other (please specify with priority, time and Related Standard Body)

9. BEMS – Building Energy Management Systems (usage stage)

	Priority	Time	Related Standard body
Energy performance metrics supported by ICT (definition of indicators based on available data from BIM & BEMS).			
Interoperability between BEMS and BIM (availability of necessary data from BIM to support operation). Harmonisation of BIM and BEMS data models regarding common objects (e.g. spaces).			
Interoperability of real time operational systems with energy producing and energy consuming equipment.			

Other (please specify with priority, time and Related Standard Body)

10. NEMS – Neighborhood Energy Management Systems (usage stage)

	Priority	Time	Related Standard body
Interoperability of NEMS with BEMS and with local generation and storage systems.			
Energy trading & brokerage protocols between buildings and local energy sources at neighbourhood/district level.			

Other (please specify with priority, time and Related Standard Body)

11. Grids (usage stage)

	Priority	Time	Related Standard body
Interoperability of BEMS & NEMS with smart metering infra-struc-tures and energy grids (availability of necessary data for holistic optimisation at building & neighbourhood & grid levels).			
Energy trading & brokerage protocols between buildings/ neighbourhoods/districts and energy grids.			

Other (please specify with priority, time and Related Standard Body)

12. Free Comments

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Exit this survey

REViSITE

Prioritization of Research & Development Topics

Specification & design (design phase)

33%

For the following categories please indicate the priority for the research topic and the time when the research results are expected to be available for industrial use

13. Please indicate your level of expertise in Specification & Design

○ Low ○ Medium ○ High

14. Design

	Priority	Time
Requirement engineering.		
Concept design.		
Detailed design, CAD, component/solution libraries.		
Configuration management, mass-customisation.		
Visualisation of design solutions.		

Other (please specify with priority, time and Related Standard Body)

15. Modelling

	Priority	Time
Modelling components, systems, buildings, districts.		
Modelling & understanding ICT impacts on energy efficiency.		
Model/BIM-based design tools (see table 6 for interoperability , data models, standards, ontologies).		
Semantic mapping, co-use of different semantics.		

Other (please specify with priority, time and Related Standard Body)

16. Performance specification & estimation

	Priority	Time
Performance metrics & criteria.		
Performance specification tools.		
Performance estimation methods and tools for simulation		
Performance estimation methods and tools for Life cycle cost analysis		
Performance estimation methods and tools for Life cycle impact assessment		

Other (please specify with priority, time and Related Standard Body)

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Exit this survey

REViSITE

Prioritization of Research & Development Topics

Construction (materialisation phase)

44%

For the following categories please indicate the priority for the research topic and the time when the research results are expected to be available for industrial use

17. Please indicate your level of expertise in Construction

○ Low ○ Medium ○ High

18. Contracting

	Priority	Time
Contract & supply network management.		
Management of performance based contracts.		

Other (please specify with priority, time and Related Standard Body)

19. Production management

	Priority	Time
Material/product/component/system specification, selection & procurement.		
Product tagging & tracking (e.g. RFID)		
Site-bound logistics.		
On/off-site production strategy and management.		
Mobile data access, guidance, decision support etc. "in the field".		

Other (please specify with priority, time and Related Standard Body)

Exit this survey

REViSITE

Prioritization of Research & Development Topics

Automation & operational decision support (usage phase)

56%

For the following categories please indicate the priority for the research topic and the time when the research results are expected to be available for industrial use

20. Please indicate your level of expertise in Automation & operational decision support

○ Low ○ Medium ○ High

21. Automation & control

	Priority	Time
System concepts.		
BEMS - Building energy management systems.		
Software & algorithms.		
Instrumentation, sensors, actuators, smart meters, smart appliances.		
Intelligent HVAC, lighting, microgeneration & storage.		
Predictive / learning control. Pattern recognition.		
Operational decision support.		

Other (please specify with priority, time and Related Standard Body)

22. Infrastructure for operations communications

	Priority	Time
Hardware, embedded intelligent devices, smart appliances.		
Secure wired/wireless/optical networks.		
Integration & service platforms, middleware, gateways.		

Other (please specify with priority, time and Related Standard Body)

23. Monitoring

	Priority	Time
Diagnostics, performance analysis, evaluation & conformance validation.		
Commissioning, energy audits, labelling.		
Operational decision support.		

Other (please specify with priority, time and Related Standard Body)

24. User awareness

	Priority	Time
Human factors Engineering Modelling user behaviour.		
User centered, situation based data visualisation.		
Support for behavioural change, social pressure & incentives.		

Other (please specify with priority, time and Related Standard Body)

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Exit this survey

REViSITE

Prioritization of Research & Development Topics

Resource & process management (all life cycle phases)

67%

For the following categories please indicate the priority for the research topic and the time when the research results are expected to be available for industrial use

25. Please indicate your level of expertise in Resource & process management

○ Low ○ Medium ○ High

26. Process integration

	Priority	Time
Business and process models.		
Inter-enterprise coordination, collaboration & communication.		
Distributed systems.		

Other (please specify with priority, time and Related Standard Body)

27. Knowledge sharing

	Priority	Time
Knowledge capture, formalisation and consolidation.		
Knowledge repositories, data mining, semantic search, long-term archival & recovery.		
Knowledge analytics of energy consumption & optimisation, pattern identification etc.		

Other (please specify with priority, time and Related Standard Body)

28. Whole life cycle management

	Priority	Time
Modelling & simulation e.g. "what-if" scenario planning & continuous improvement.		

Other (please specify with priority, time and Related Standard Body)

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Exit this survey

REViSITE

Prioritization of Research & Development Topics

Energy trade & trans-actional management (usage phase)

75%

For the following categories please indicate the priority for the research topic and the time when the research results are expected to be available for industrial use

29. Please indicate your level of expertise in Energy trade & transactional management

○ Low ○ Medium ○ High

30. District / neighborhood energy management beyond buildings

	Priority	Time
District energy management systems.		
ICT architectures and infrastructures for districts.		
Management of local generation, distribution and storage.		
Energy trading & brokerage, prosumer forecasting, resource tracking, consumption/price negotiation.		

Other (please specify with priority, time and Related Standard Body)

31. Smart grids and the built environment

	Priority	Time
Smart metering.		
Balancing between users' need (e.g. comfort) and supply side constraints (demand control).		

Other (please specify with priority, time and Related Standard Body)

Prev Next

Exit this survey

REViSITE

Prioritization of Research & Development Topics

System integration (all life cycle phases)

89%

For the following categories please indicate the priority for the research topic and the time when the research results are expected to be available for industrial use

32. Please indicate your level of expertise in System integration

○ Low ○ Medium ○ High

33. System integration

	Priority	Time
Plug & play connections/interfaces.		
Integration platforms, gateways, middleware.		
Service oriented architectures, web services, cloud based services, event driven architectures.		
Integration of BIM to real time operational systems.		
Integration of BEMS with external monitoring and services.		

Other (please specify with priority, time and Related Standard Body)

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Exit this survey

REViSITE

Prioritization of Research & Development Topics

Free Comments Page

100%

34. Please provide us with any free comments

Thanks a lot for your precious time. If you want to be updated on the Project Findings please visit:
www.revisite.eu

Prev Done

Appendix III: Results Analysis about the Surveymonkey Questionnaire

WebSurvey Results about ICT for Energy Efficiency Research and Development Topics

Author(s): Antonio Feraco Innova

The questionnaire developed by the REViSITE Consortium has been developed in order to define the main research priorities for ICT for Energy Efficiency in respect to the already developed SMARTT taxonomy, already described previously.

Such questionnaire has been named: Prioritization of Research and Development Topics for ICT for Energy Efficiency.

The questionnaire has been also used during several conferences and customised according to the conference audience.

It has been structured in six different sections, each one related to the respective macro category identified by the REViSITE consortium in its SMARTT taxonomy.

The following results are related to the one posted in www.surveymokey.com and kept on the web until the end of the project.

The link to the questionnaire has been sent out to 160 recipients with only 16 answers received, representing the 10%. Plus it has been posted also in several LinkedIn groups such as: ICT4E2B, SmartGrid Group, CABA research Group, SmartLED, and ICT for Energy Efficiency Group, thus the respondent percentage is not accurate.

Respondents have been asked to which class of stakeholders they belong. The most of them belong to Research Institute with 50%, Project Manager with 21,4%, Construction Company / Subcontractors (Building, building service systems) with 14.3%, and Building Client / Owner / Developer / housing organisation, ICT provider / developer, Energy Utility, Other (not specified) with the 7.1%

The most of the respondents have expertise in the R&D Sector with a response percentage of the 64.30%, followed by the Building use / Operation / monitoring / maintenance and ICT software / services expertise with the 21.40% each, and by the 14.30% of Energy Management at Building / district level and others (7.1% each from Control System Cyber Security and Virtual Reality) . The other classes taking part in the survey were the building design, the Building automation / Electrical Building Services and Construction / Renovation Classes with the 7.1%, and no response from the Building Material / Components class:

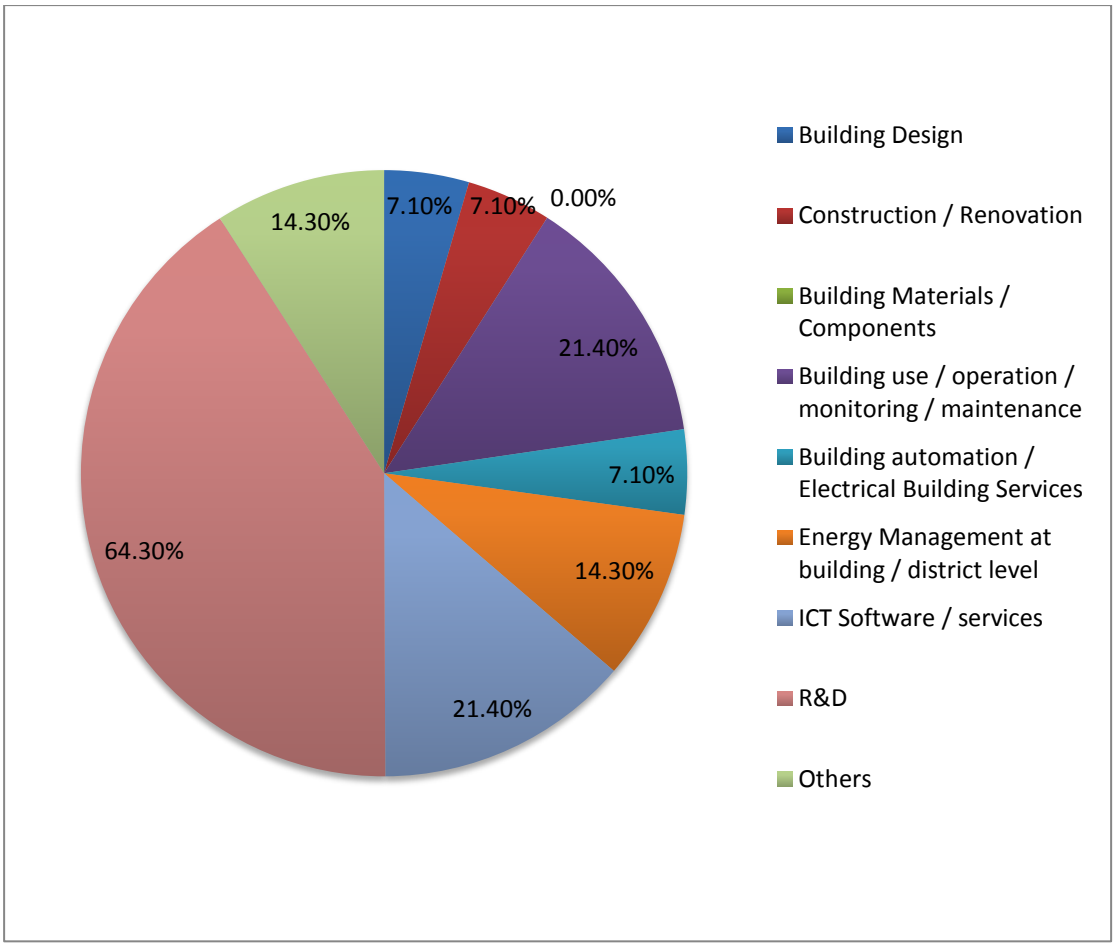


Figure 15: Stakeholders class respondents

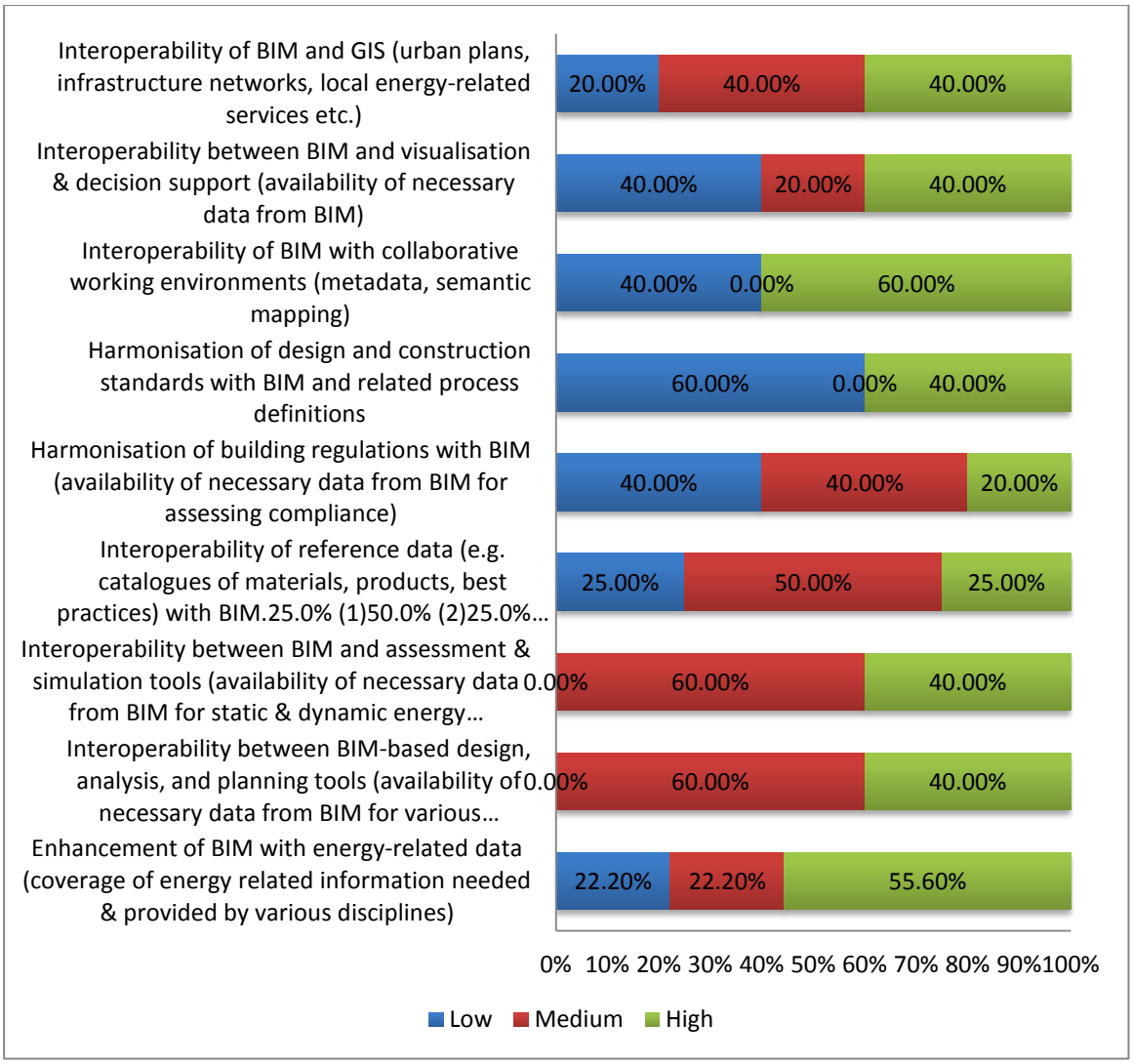
The first section of the questionnaire was based on Data Models, Interoperability & Standards, in which the 81.8% of respondents indicated that they possess a medium level expertise, while the 9.1% has high level expertise, and the same 9.1% has low level expertise in this field.

Respondents have been asked about which of the identified research priority would have the highest impact on the ICT for Energy Efficiency sectors covered by the REViSITE project.

In the BIM - building information model (design stage) section the research priorities that resulted with the most high potential impact are in order[4]:

- *Interoperability of BIM with collaborative working environments (metadata, semantic mapping*
- *Enhancement of BIM with energy-related data (coverage of energy related information needed & provided by various disciplines)*

[4] For your convenience we list the first two. The remaining priorities and their scoring are visible in the chart.



To what instead concerns the timing of such research priorities will impact on ICT for Energy Efficiency, the overall audience defined that Interoperability of BIM and GIS (60%) together with Interoperability of BIM with collaborative environments (60%) will impact in the short term, while Interoperability of reference data (75%) and Enhancement of BIM with energy related data (71.4%) will impact in the medium term. The priorities that will impact the most on the long term are Harmonisation of building regulations with BIM (40%) and Harmonisation of design and construction standards with BIM and related process definitions (40%).

On this topic we also asked to respondents in relation to the specific Research Priority identified, which should be the Related Standard Body. The following table summaries the responses indicating the first three standard body and the relative percentage of preference chosen by the respondents:

Research Topic	*First indicated Standard Body*	*Second Indicated Standard Body*	*Third Indicated Standard Body*
Enhancement of BIM with energy-related data (coverage of energy related information needed & provided by various disciplines).	BuildingSMART (40%)	ETSI (20%)	ISO (20%) SBA (20%)
Interoperability between BIM-based design, analysis, and planning tools (availability of necessary data from BIM for various application tools).	ISO (75%)	IEC (25%)	
Interoperability between BIM and assessment & simulation tools (availability of necessary data from BIM for static & dynamic energy performance estimation).	BuildingSMART (25%)	CEN (25%)	ISO (25%) IEC (25%)
Interoperability of reference data (e.g. catalogues of materials, products, best practices) with BIM.	ETSI (33%)	BuildingSMART (33%)	IEC (33%)
Harmonisation of building regulations with BIM (availability of necessary data from BIM for assessing compliance).	ISO (50%)	BuildingSMART (25%)	ITU (25%)
Harmonisation of design and construction standards with BIM and related process definitions.	BuildingSMART (33%)	ISO (33%)	IEC (33%)
Interoperability of BIM with collaborative working environments (metadata, semantic mapping).	BuildingSMART (50%)	ISO (50%)	IEC (50%)
Interoperability between BIM and visualisation & decision support (availability of necessary data from BIM).	BuildingSMART (68.7%)	CEN (33.3%)	
Interoperability of BIM and GIS (urban plans, infrastructure networks, local energy-related services etc.)	BuildingSMART (50%)	ISO (50%)	

The next section of the questionnaire focused on respondents view about BEMS – Building Energy Management Systems, which of the identified category impact the most, within which timeframe and which is the most appropriate standard body to address for.

The identified research topic that will have high impact on ICT for Energy Efficiency in the BEMS are in order:

- *Interoperability of real time operational systems with energy producing and energy consuming equipment. High Impact (87.5% of preferences)*

- *Energy performance metrics supported by ICT (definition of indicators based on available data from BIM & BEMS). High Impact (60%)*
- *Interoperability between BEMS and BIM (availability of necessary data from BIM to support operation). Harmonisation of BIM and BEMS data models regarding common objects (e.g. spaces). Medium Impact (60%)*

The respective timeframe is following reported:

Research Topic	***Short***	***Medium***	***Long***
Energy performance metrics supported by ICT (definition of indicators based on available data from BIM & BEMS).	80%	20%	0
Interoperability between BEMS and BIM (availability of necessary data from BIM to support operation). Harmonisation of BIM and BEMS data models regarding common objects (e.g. spaces).	40%	60%	0
Interoperability of real time operational systems with energy producing and energy consuming equipment.	57.1%	42.9%	0

While the related Standard Body are:

Research Topic	***Standard Bodies***		
Energy performance metrics supported by ICT (definition of indicators based on available data from BIM & BEMS).	ETSI (33%)	ITU (33%)	BuildingSMART (33%)
Interoperability between BEMS and BIM (availability of necessary data from BIM to support operation). Harmonisation of BIM and BEMS data models regarding common objects (e.g. spaces).	BuldingSMART (66.7%)	IEC (33%)	
Interoperability of real time operational systems with energy producing and energy consuming equipment.	ITU (33%)	BuildingSMART (33%)	IEC (16.7%) CENELEC (16.7%)

According to the respondents among the NEMS – Neighbourhood Energy Management Systems (usage stage) the highest impact will be represented by Interoperability of NEMS with BEMS and with local generation and storage systems with the 62.5%, while the Energy trading & brokerage protocols between buildings and local energy sources at neighbourhood/district level will have a medium impact with the 42.9%, but both this priorities will impact in the medium period. The related suggested standard bodies are: for the Interoperability of NEMS with BEMS it is ITU with the 40%, followed by IEC and CENELEC with the 20%; for the Energy trade and brokerage protocols ETSI has been voted by the 50% of respondents, followed by ITU and IEC both with the 25%.

The second section of the questionnaire focused on investigating priority identified among the Specification and Design category. As per the previous section respondents have been asked about their expertise in the related field: the 71.4% indicated they own an high level expertise, while the 28.6% indicated a medium level one.

The research topics have been divided into three different subcategories: Design, Modelling and Performance Specification & estimation.

On the Design subcategory, the priority with the highest impact indicated by respondents is 'Requirements Engineering' with the 71.4%, followed by the 'Concept Design' with the 57.1% and by the 'Visualisation of Design Solution' with the 42.9%. While 'Detailed Design, CAD, component solutions libraries' and 'Configuration Management, Mass customisation' have been indicated with a medium level impact respectively with the 42.9% and 50%.

The respective impact will be in the short period for 'Requirement Engineering' (66.7%) and 'Concept Design' (66.7%), for the remaining three priorities – 'Detailed Design, CAD, component solutions libraries', 'Configuration management, mass-customisation' and 'Visualisation of design solutions' – their impact is foreseen in the medium period with respective the 66.7%, 60% and 42.9% respondents stating so.

For the Modelling subcategory the four research topics investigated were:

- *'Modelling components, systems, buildings, districts', whose impact is considered being high by the 80% of answers and in the medium term period (60%)*
- *'Modelling & understanding ICT impacts on energy efficiency', whose impact is considered high by the 60% and its timeframe is the medium term period (60%)*
- *'Model/BIM-based design tools (see table 6 for interoperability , data models, standards, ontologies)', whose impact is considered high by the 60% and in a medium term period by the 80% of respondents,*
- *'Semantic mapping, co-use of different semantics', which impact is considered to be of medium level by all respondents (100%) and in the medium term period (100%).*

The last subcategory investigated is related to priorities included into the 'Performance Specification and estimation'.

Such priorities and the respective level of impact and timing are following described:

- *'Performance metrics & criteria', that is considered to have an high impact by all respondents and in the short period time (100%)*
- *'Performance specification tools', that is considered having an high impact by the 75% of answers and in the medium term period*
- *'Performance estimation methods and tools for simulation' is considered to have both a medium impact and high impact (50% and 50%) but in a medium term period (75%).*
- *'Performance estimation methods and tools for Life cycle cost analysis', has been indicated as having an high impact (60%) in the short and medium time period.*
- *'Performance estimation methods and tools for Life cycle impact assessment'. It has been indicated as having both a medium level and an high impact by the 40% of respondents and impacting in the medium period time (60%).*

Within the third section, the one related to Construction (Materialisation phase), the expertise of respondents was characterised by the following percentage: High level with the 14.3%, medium level and low level with the 42.9%.

The subcategories identified and the respective research priorities are:

- *Contracting*
- *'Contract and Supply Network Management', considered as impacting with low, medium and high impact mostly in the medium period (66.7%)*
- *'Management of performance based contracts', considered of high impact (67.7%) within the medium period.*
- *Production Management*
- *'Material/product/component/system specification, selection & procurement' considered of high impact (50% of respondents) in the short period (67.7%)*
- *'Product tagging & tracking (e.g. RFID)' considered of medium impact by the 67.7% of respondents in a medium period time (67.7%)*
- *'Site-bound logistics', considered of medium impact (66.7%) in the medium period (100%)*
- *'On/off-site production strategy and management', considered of high impact (100%) in the short period time (100%)*
- *'Mobile data access, guidance, decision support etc. "in the field"', considered of high impact (66.7%) during the all three timelines.*

The fourth section of the questionnaire focused on the "Automation & Operational Decision Support (Usage Phase). The related respondents' expertise indicated is: high by the 85.7% and low by the 14.3%.

The subcategories identified are:

- *Automation and Control*
- *Infrastructure for operations communications*
- *Monitoring*
- *User Awareness.*

In the first subcategory, Automation and Control, the identified priorities with the respective impact and timeline is shown in the following table:

Priority	***Impact (%)***	***Timeline (%)***
System concepts	Medium 75%	Short (33) Medium (33%) Long (33%)
BEMS - Building energy management systems.	High (100%)	Medium (66.7%)
Software & algorithms.	High (80%)	Medium (50%)
Instrumentation, sensors, actuators, smart meters, smart appliances.	High (83.3%)	Short (60%)
Intelligent HVAC, lighting, microgeneration & storage.	High (60%)	Short (50%)
Predictive / learning control. Pattern recognition.	High (60%)	Medium (50%)

Operational decision support.	High (80%)	Medium (50%)

The second subcategory provided the following table results:

Priority	***Impact (%)***	***Timeline (%)***
Hardware, embedded intelligent devices, smart appliances.	High (83.3)	Medium (66.7%)
Secure wired/wireless/optical networks.	High (66.7%)	Short (80%)
Integration & service platforms, middleware, gateways.	High (83.3%)	Medium (60%)

The third subcategory, Monitoring, provided the following results:

Priority	***Impact (%)***	***Timeline (%)***
Diagnostics, performance analysis, evaluation & conformance validation.	High 60%	Medium (80%)
Commissioning, energy audits, labelling.	Medium (50%)	Medium (66.7%)
Operational decision support.	High (66.7%)	Medium (66.7%)

The results of the final subcategory, User Awareness, is followed given:

Priority	***Impact (%)***	***Timeline (%)***
Human factors Engineering Modelling user behaviour.	High (40%) Medium (40%)	Medium (75%)
User centered, situation based data visualisation.	Medium (60%)	Medium (75%)
Support for behavioural change, social pressure & incentives.	Medium (40%) Low (40%)	Long (75%)

The following section of the questionnaire focused on the Resource and Process Management (it includes all life cycle phases). The 50% of respondents indicated a medium expertise in the topics, while the 33.3 a low expertise and the 16.7% indicated an high expertise.

The subcategories and their priorities are described in the following tables:

Process Integration:

Priority	***Impact (%)***	***Timeline (%)***

Business and process models.	Medium (50%)	Medium (66.7%)
Inter-enterprise coordination, collaboration & communication.	High (75%)	Short (66.7%)
Distributed systems.	Medium (75%)	Medium (100%)

Knowledge Sharing:

Priority	***Impact (%)***	***Timeline (%)***
Knowledge capture, formalisation and consolidation.	High (75%)	Short (66.7%)
Knowledge repositories, data mining, semantic search, long-term archival & recovery.	Medium (66.7%)	Medium (100%)
Knowledge analytics of energy consumption & optimisation, pattern identification etc.	High (66.7%)	Medium (100%)

Whole life cycle management

Priority	***Impact (%)***	***Timeline (%)***
Modelling & simulation e.g. "what-if" scenario planning & continuous improvement.	High (75%)	Medium (50%)

The next section focused on Energy Trade & Trans-actional Management (Usage phase) and the respondents indicated the following level of expertise: Low the 80% and medium the 20%.

Such section comprises two subcategories that are following indicated together with respective priorities:

District / neighborhood energy management beyond building

Priority	***Impact (%)***	***Timeline (%)***
District energy management systems.	Medium (75%)	Medium (66.7%)
ICT architectures and infrastructures for districts.	High (50%) Medium (50%)	Medium (66.7%)
Management of local	High (100%)	Medium (66.7%)

generation, distribution and storage.		
Energy trading & brokerage, prosumer forecasting, resource tracking, consumption/price negotiation.	Medium (50%)	Short (33.3%) Medium (33.3%) Long (33.3%)

Smart Grid and Built Environment

Priority	***Impact (%)***	***Timeline (%)***
Smart metering.	High (100%)	Short (50%)
Balancing between users' need (e.g. comfort) and supply side constraints (demand control).	High (80%)	Medium (60%)

The last section focused on System Integration (it includes all Life Cycle Phases) had the 66.7% od respondents with a medium level of expertise and the remaining 33.3% with an high level of expertise.
The subcategories and their priorities are following reported in tables:

System Integration:

Priority	***Impact (%)***	***Timeline (%)***
Plug & play connections/interfaces.	High (100%)	Medium (75%)
Integration platforms, gateways, middleware.	High (80%)	Short (50%)
Service oriented architectures, web services, cloud based services, event driven architectures.	High (40%) Medium (40%)	Medium (75%)
Integration of BIM to real time operational systems.	High (80%)	Medium (75%)
Integration of BEMS with external monitoring and services.	Medium (75%)	Medium (75%)

The final question was an open one, where respondents have been asked for free comments, but any of them provided any input.

Appendix IV: Consultation Version of the D3.2

APPENDIX: FEEDBACK ON THE DRAFT REPORT:

D3.2 MULTI-DISCIPLINARY STRATEGIC RESEARCH AGENDA FOR ICT-ENABLED ENERGY EFFICIENCY – [SHORT VERSION FEB – 2012]

The REVISTE project aims to recommend further research, development and standardisation relating to the topics described within D3.2, listed right.

Question 1:
What proposed research topics are most relevant to your own organisational perspective?
Please tick on the right. ⇨

Question 2:
Are any important research topics missing? If 'yes' please specify:

1. Specification & design ICTs	
• Design conceptualisation	☐
• Detailed design	☐
• Modelling	☐
• Performance estimation	☐
• Simulation	☐
• Specification & product/component selection	☐
2. Materialisation ICTs	
• Decision support & visualisation	☐
• Planning & management	☐
• Real-time communication	☐
3. Automation and Operational Decision Support ICTs	
• Automated monitoring & control	☐
• Operational decision support & visualisation	☐
• Secure wired / wireless sensor networks & quality of service	☐
4. Resource and Process Management ICTs	
• Inter-enterprise coordination	☐
• Business process integration	☐
• Information/knowledge management & analytics	☐
5. Technical & sematic interoperability ICTs	
• Integration technologies & infrastructures	☐
• Interoperability & standards	☐
6. Trading and transactional management ICTs	
• Regional energy management	☐
• District energy management	☐
• Facility energy management	☐
• Personal energy management	☐

Question 3:
Are the suggested timelines discussed in D3.2 appropriate?
If 'no' please elaborate:

Question 4:
Any other comments?
Please describe below:

Respondent:		Sector:	Energy	☐	Other, plse specify:	
Organisation			Manufng	☐		
Person			Buildings	☐	Organisation type:	
Email			Lighting	☐	Industry / private	☐
Date			ICT	☐	Research / public	☐

CLICK HERE TO SEND BACK THE FILE

Appendix V: Results for D3.2 Consultation Version

Feedback on the draft report: D3.2 Multi-disciplinary Strategic Research Agenda for

The REVISTE project aims to recommend the topics on the right for further research, development and standardisation.

Question 1:
Are any important research topics missing? If 'yes' please specify:

Question 2:
What proposed research topics are most relevant to your own organisa-tional perspective?
Please tick on the right. =>

Question 3:
Are the suggested timelines discussed appropriate?
If 'no' please elaborate:

Question 4:
Any other comments?
Please describe below:

1. Specification & design ICTs	
- Design conceptualisation	7
- Detailed design	5
- Modelling	8
- Performance estimation	10
- Simulation	8
- Specification & product/component selection	5
2. Materialisation ICTs	
- Decision support & visualisation	7
- Planning & management	5
- Real-time communication	5
3. Automation and Operational Decision Support ICTs	
- Automated monitoring & control	10
- Operational decision support & visualisation	9
- Secure wired / wireless sensor networks & quality of service	9
4. Resource and Process Management ICTs	
- Interenterprise coordination	5
- Business process integration	7
- Information/knowledge management & analytics	7
5. Technical & sematic interoperability ICTs	
- Integration technologies & infrastructures	8
- Interoperability & standards	10
6. Trading and transactional management ICTs	
- Regional energy management	6
- District energy management	11
- Facility energy management	10
- Personal energy management	8

Respondent:		**Sector:**		Other, plse specify:	
Organisation		Energy	3		
Person		Manufng	1		
Email		Buildings	5	Organisation type:	
Date		Lighting	0	Industry / private	7
		ICT	4	Research / public	7

Appendix VI: Description of the Scouted Project Initiatives

Project Title	PREMIO
Project web-site	http://www.projetpremio.fr/
Funding Context and Theme	PACA - Provence-Alpes-Côte d'Azur Region (France)
Starting Date and Duration	2008-2013 (60 months)
Budget	4 million Euros
Partnership	CapEnergies, Armines, Cristopia, CyXplus, EDF, ERDF, Giordano, SAED, Transenergie, Watteco, Supra
Location	Lambesc, Fréjus & Gardanne /FRANCE
Abstract	PREMIO is the first smart grid demonstrator to be operational in France. Based in Lambesc (Bouches-du-Rhône), this project started by the Capenergies cluster (competitiveness cluster dedicated to clean energies) and the PACA region brings together a research laboratory, a major group, 7 SMEs and 3 local authorities. The objective is to optimize on site the integration of distributed generation, electricity storage and demand side management. The project aims at further enhancing renewable energies as well as initiatives in energy saving to enable peak shaving in the local grid and to reduce CO2 emissions at the same time. The PREMIO demonstrator runs several real-time experiments in order to: • Remove (lower or cut) electric consumption in buildings without reducing user comfort • Manage public lighting across the road network • Thermal or ice storage and load shedding • Produce electricity locally from renewable energies and storage In the frame of Connectivity Week 2011 in Santa Clara, California, PREMIO was awarded in the category Smart Grids. It received the Buildy Award. Furthermore, PREMIO is one of two European demonstration projects taking part in the “Smart Grid Demonstration Initiative” conducted by the American institute EPRI. This initiative is aimed at connecting and benefiting from the experience collected within demonstration projects on the topic of Smart Grids on an international level.
Type of Project	Pilot project
Technical keywords description	District & Grid management, Energy production management, Energy monitoring, Automation & Control Not in REEB taxonomy: Smart grid, Energy storage, Renewable energy, Distributed generation, Public lighting, Demand side management, Load shedding

Keywords from a more global view	Smart Environment

Project Title	NOBEL
Project web-site	http://www.ict-nobel.eu/
Funding Context and Theme	7th Framework Programme EU
Starting Date and Duration	2010-2013 (30 months)
Budget	1.9 million €
Partnership	SUMINISTROS ESPECIALES ALGINETENSES COOP. V., SAP AG, CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS, UNIVERSITAET DUISBURG-ESSEN, SICS, SWEDISH INSTITUTE OF COMPUTER SCIENCE AB
Location	-
Abstract	The **NOBEL** (Neighbourhood Oriented Brokerage ELectricity and monitoring system) project is to develop, integrate and validate ICT enabling a reduction of the currently spent energy, by providing a more efficient distributed monitoring and control system in neighbourhoods. The project is building an energy brokerage system with which individual energy consumers can communicate their energy needs directly with both large-scale and small-scale energy producers, thereby making energy use more efficient. This brokerage system is using a middleware system to communicate energy consumption data and will use IPv6 technology to interconnect the middleware with sensors and energy meters on individual devices. The ODYSSEUS project will share with NOBEL the concept of dynamic energy management, taking care of actual energy needs, but will go further by targeting more high-level semantic interoperability and holistic optimization of energy management at level of the neighbourhoods.
Keywords	Energy grids, real-time load management

Project Title	MIRABEL
Project web-site	http://www.mirabel-project.eu/
Funding Context and Theme	7th Framework Programme EU
Starting Date and Duration	2010-2013 (36 months)
Budget	1.9 million €
Partnership	SAP AG (Germany), Aalborg Universitet (Denmark), Centre for Renewable Energy Sources (Greece), EnBW Energie Baden-Württemberg AG (Germany), INEA (Slovenia), Jožef Stefan Institute (Slovenia), Technische Universität Dresden (Germany), TNO

	(Netherlands)
Location	-
Abstract	MIRABEL stands for Micro-Request-Based Aggregation, Forecasting and Scheduling of Energy Demand, Supply and Distribution. Supported by the European Commission's Seventh Framework Programme (FP7), the main goal of the MIRABEL Project is to develop an approach on a conceptual and an infrastructural level that allows energy distribution companies to balance the available supply of renewable energy sources and the current demand in ad-hoc fashion. Many Renewable Energy Sources (RES, e.g., windmills, solar panels) pose the challenge that production is dependent on external factors (wind speed and direction, amount of sunlight, etc.). Hence, available power can only be predicted but not planned, which makes it rather difficult for energy distributors to efficiently include renewable energy sources into their daily schedules.
Keywords	Households, Industry, Transport, Services, RES, Controlled Energy Production

Project Title	ODYSSEUS
Project web-site	N.A.
Funding Context and Theme	7th Framework Programme EU
Starting Date and Duration	
Budget	
Partnership	Telvent / Centre Scientifique et Technique du Bâtiment / Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek / Advantic / Priva / ESOCE - Net (Italy-Rome) / Manchester City Council / Municipio Roma XI
Location	-
Abstract	Energy management in neighbourhoods like urban areas is currently hard to optimize due to two major reasons: The complexity of the neighbourhood, covering many types of buildings (houses, offices, public buildings, etc.), many types of civil infrastructures and furniture (roads, bridges, tunnels lighting) and other energy related objects (renewable energy systems, vehicles but also the citizens themselves). All these objects have their own variable energy usage patterns, and have typically all energy-related subsystems and devices impacting each other with respect to energy production, storage and consumption. The current fragmentation and lack of interoperability among the various energy subsystems and devices for both hardware/software and information aspects. The separated businesses around these subsystems/devices result in a heterogeneous situation with many different and incompatible communication and information exchange protocols that hamper proper integration and limit advanced

	functionalities over them. This leaves a need and an opportunity to further optimize energy consumption/production/storage and cost by moving to innovative and smarter dynamic holistic energy management systems allowing advanced control in neighbourhoods enabled by advances in ICT.
Keywords	Energy Management in Neighbourhood, building, lighting