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SEMANTIC Semantic Tools for Carbon Reduction in Urban Planning

SEMANTICO

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EXECUTIVE SUMMARY

The current deliverable covers all dissemination outputs of the SEMANTCO project and presents an evaluation of the dissemination results achieved against those presented as being planned to be achieved in the dissemination plan, originally presented in Month 24. As presented in the SEMANTCO dissemination plan, the dissemination activities were designed to follow a three stage pathway:

- Awareness – making as many organisations and stakeholders as possible aware of SEMANTCO
- Understanding – identifying the types of organisations and stakeholders with potential to benefit from the use of the SEMANTCO tools
- Action – identifying organisations and stakeholders which might directly adopt the outputs arising from the SEMANTCO project

In accordance with this approach, the current deliverable breaks the reporting of the dissemination work achieved within SEMANTCO into several distinct categories. In turn these are:

- Workshops and events organised by the SEMANTCO project. These focused mainly on workshops aimed at engaging stakeholders beyond the case studies.
- Attendance of external events aiming at engaging with stakeholders beyond the case studies. This work included the preparation of appropriate materials to support it.
- The publication of various non scientific articles publicising SEMANTCO in trade magazines and similar.
- The publication of papers describing the scientific results arising from within the SEMANTCO project.
- The development of the SEMANTCO dissemination network.

This document summarizes all of this effort, covering all three years of the SEMANTCO project, and finishes with a chapter evaluating how well the dissemination activities carried out during the project matched those intended in the original dissemination plan.

1 INTRODUCTION

1.1 Purpose and target group

The principal purpose of the current report is to describe the work undertaken throughout the course of the SEMANCO project in order to disseminate the results of the SEMANCO project.

In summary the current document has the following chapters:

- Chapter 2 focuses on briefly describing several major dissemination events that the SEMANCO project was primarily responsible for organising. These principally included events for contacting stakeholders outside of the main case study areas.
- Chapter 3 lists the set of externally organised stakeholder dissemination events that have been attended by members of the SEMANCO project team, and on the various written materials produced to aid this.
- Chapter 4 describes the academic publications produced by, and planned by, the SEMANCO project.
- Chapter 5 focuses on the non academic publications produced by the SEMANCO project. These served to highlight the results of SEMANCO to a wide audience. This Chapter includes a discussion about the development of the dissemination network during the course of the SEMANCO project and the newsletters sent to the members.
- Chapter 6 presents an evaluation of the results presented in the previous chapters against the goals originally set out in the month 24 dissemination plan.

The report covers all such activities conducted during the first 36 months of the SEMANCO project, along with certain academic publications which are planned to be published in the remaining three months of the project, until month 39.

1.2 Contribution of partners

All SEMANCO partners have contributed to the dissemination activities. The NEA and FORUM have been the most active contributors to engaging external stakeholders along with UoT, FUNITEC and RAMBOLL.

Throughout the document, the tables describing the results achieved for each dissemination activity also describe which partner(s) was principally responsible for that specific result.

1.3 Relations with other activities in the project

There is a close relationship between the activities reported in this document and the work carried out in the different workpackages of the SEMANCO project, since the purpose of the activities has been to let stakeholders and organizations know about the project results. Therefore, the work reported in this deliverable spans multiple different workpackages within the project, with Tasks 6.5 *Engaging practitioners beyond the case studies* and Task 7.5 *Project stakeholder dissemination events* being most prominent.

One major additional theme has been the presentation of prototype versions of the SEMANTCO software to end users and the gathering of feedback resulting from this. This information has made a valuable contribution to the development of the SEMANTCO project by:

- Providing valuable guidance for the development of the tools within Work Package 5,
- Capturing many members for the SEMANTCO dissemination network, thus contributing to the work of T7.2,
- Providing a major contribution to the task of developing the exploitation plan in T7.4.

2 SEMANCO ORGANISED EVENTS

2.1 Introduction

One major way in which the dissemination activities conducted within the SEMANCO project have been focused over time has been the holding of specific workshops. At each of these events the results of the SEMANCO project have been presented and valuable feedback gathered.

In total there have been four major workshops organised by the SEMANCO project:

- A workshop held in Barcelona on the 11th and 12th of April 2013 called “Analysing and visualising energy related data in our Buildings, Towns and Cities”,
- A series of three stakeholder workshops held in late May 2014, with one event for each SEMANCO case study area. This meant one event in Manresa, one in Copenhagen and one in Newcastle.

The Barcelona workshop forms part of the work explicitly detailed in the description of work concerning Task 6.5 *Engaging practitioners beyond the case studies*. The main body of the report produced subsequent to this workshop can be found in Appendix A to this document and the full report is available in the SEMANCO website.¹

The three stakeholder workshops held in May 2014 had an entire task and deliverable devoted to them, namely Deliverable 7.5 *Project Stakeholder Dissemination Events*. The presentation of these events in the current deliverable is therefore limited to a concise summary of the purpose and overall structure of each event.

The SEMANCO project also, in conjunction with the ADAPT4EE project, organised a two-day VOCamp dedicated to the design of ontologies for energy efficiency in Urban Planning. This event was held in Barcelona on the 13th and 14th of February 2014. Its organisation was due to Task 4.6 *VoCamp energy data models for urban planning* and it is described in full in Deliverable 4.6 *VoCamp energy data models*.

In addition to these major events, the SEMANCO project has organised a large number of smaller scale events and meetings in order to disseminate the results of the project. These principally focused on the three case study areas selected by the project –Newcastle, Copenhagen and Manresa– and are listed in a table in Section 2.5 below.

¹http://arcdev.housing.salle.url.edu/semanco/SEMANCO_Barcelona_Workshop_Outline_Discussion_Document_Public_Version_FINAL.pdf

2.2 Analysing and visualising energy related data in our Buildings, Towns and Cities



Figure 1. Picture of the event, School of Engineering and Architecture La Salle, Barcelona

The workshop "Analysing and Visualising Energy Related Data in our Buildings, Towns and Cities" was held in Barcelona on the 11th and 12th of April 2013. The purpose of the workshop was to bring together the community of researchers working on the application of ICT to energy efficiency to discuss three various issues related to the subject of analysing and visualising energy related data.

Thirty-eight participants attended this workshop, including representatives from sixteen European research projects. Overall the workshop lasted for the two full days and included many fruitful discussions. The main body of the report produced as a result of the workshop can be found in appendix A of the current document.

This workshop was carried out within Task 6.5 *Engaging practitioners beyond the case studies*. Further information can be found in both the workshop blog: <http://semanco-visualization-workshop.blogspot.com.es/> and in the full version of the report: http://arcdev.housing.salle.url.edu/semanco/SEMANTCO_Barcelona_Workshop_Outline_Discussion_Document_Public_Version_FINAL.pdf

2.3 Summative stakeholder workshops



Figure 2. Picture from the Newcastle event

Three stakeholder workshops were held in the final weeks of May 2014. Each event was held in one of the case study areas of the project and was organised by the project partner most closely involved with that area. Ramboll organised an event in Copenhagen, the NEA one in Newcastle and Forum one in Manresa. UoT were responsible for coordinating the events.

The purpose of these events was to present the results arising from the SEMANTCO project to stakeholders and to receive a summative evaluation regarding their likely utility within their organisations. Each event was a full day affair, featuring talks in the morning session before a presentation of SEMANTCO followed by group discussions. A questionnaire was used in order to gather quantitative feedback.

The events were a notable success with a combined total of around 130 people attending, spread over industry, academia and local government. Valuable feedback was gathered and many new people signed up for the SEMANTCO dissemination network.

These workshops had an entire task, and deliverable – namely Deliverable 7.5 *Project Stakeholder Dissemination Events* – devoted to them. This deliverable contains a detailed description of each of the workshops and of the combined results derived from them.

2.4 Vocabulary Camp (VoCamp)



Figure 3. Participants in the VoCamp, School of Engineering and Architecture La Salle, Barcelona

The 4th Vocabulary Camp (VoCamp) on “Integrating multiple domains and scales”, took place at La Salle Engineering and Architectural School in Barcelona, from the 13th to 14th February 2014 and was organised by the SEMANTCO project.

The VoCamps series is an initiative of the European Commission carried out with the support of the ADAPT4EE project. According to its original intention, a VoCamp is an informal event where experts meet to deliver lightweight vocabularies and corresponding ontologies for the Semantic Web (Web-of-Data). The goal of every VoCamp is to bring together 20 to 30 experts to discuss the state of the art about a specific topic and to come up with a proposal for new or enriched vocabularies.

The purpose of this VoCamp was to discuss the application of ontologies to integrate data from various domains and scales to improve the energy efficiency in urban areas.

The workshop program was structured around three interrelated issues:

1. Urban Energy Systems: determining the boundaries and objectives of urban energy systems.
2. Data Sources: representing objects and properties in urban energy systems.
3. Visualisation: combining different visualisation models to facilitate knowledge elicitation processes.

These issues were discussed in thirteen presentations delivered by representatives of five research projects (SEMANTCO, Ready4SmartCities, NRG4Cast, COOPERaTE and Odysseus) which are dedicated to the application of ontologies in the field of energy efficiency. Overall 33 people attended the event.

This event was organised due to the Task 4.6 *VoCamp energy data models for urban planning* and is described in full detail in the corresponding Deliverable 4.6.



Figure 4. Keynote speech by Dr. Koen van Dam, School of Engineering and Architecture La Salle, Barcelona

2.5 Smaller stakeholder events

In addition to these externally organised conferences, the SEMANTCO project has organised multiple workshops, where end users with relevance to each of the specific case studies were invited. These workshops were used to both grow the dissemination network and to gain direct feedback regarding the functionality of the integrated platform.

Table 1. List of internal stakeholder workshops

Event	Website/details (nature of the event)	Dates	Potential engagement (presentation, display stand, poster, etc.)	SEMANTCO Partners involved
2012				
November				
Workshop	FORUM hosted a presentation within a Seminar with Architects from Palestine and Gaza. A brief explanation of the SEMANTCO project was given to delegates, leaflets are provided and they are informed that are going to be included in the dissemination network.	November 2012	Discussion, leaflet	FORUM
2013				
February				
Workshop	A series of 5 stakeholder engagement workshops held in Manresa, Spain. Held with a variety of stakeholders relevant to the Manresa case study. These included: Staff from the urban planning department of the municipality, representatives of the local Government and a group of selected architects from the central region of	February – April 2013	Presentation of SEMANTCO, the partners and the tool. PowerPoint	FORUM, CIMNE

	Catalonia.			
Workshop	Stakeholder engagement workshop at Leicester UK. Stakeholder event with a large cross section of stakeholders including social housing providers, utility companies and facility management.	Feb 2013	Presentation of SEMANTCO, the partners and the tool. PowerPoint	UoT, NEA
Workshop	Stakeholder engagement workshop at Teesside University, UK. Stakeholder event including energy consultants, local authority officers, business providers (low carbon housing) and people with property management responsibilities.	Feb 2013	Presentation of SEMANTCO, the partners and the tool. PowerPoint	UoT, NEA
Workshop	Stakeholder engagement workshop. A meeting with the MARIE research project to determine the potential for collaboration between the two projects.	Feb 2013	Discussion c.f. potential collaboration	FORUM, FUNITEC
May				
Workshop	Stakeholder engagement workshop at seven oaks, UK. A presentation to approximately 20 of NEA's business support group organisations about both SEMANTCO in general and some specific features of the Newcastle case study was made.	May 2013	Presentation of SEMANTCO, the partners and the tool.	NEA, UoT
Workshop	This was a follow on meeting with one of the architects contacted in an earlier workshop regarding possible future collaborations linking with their own research work.	May 2013	Direct discussion	FORUM
June				
Workshop	Workshop with Ramboll employees working with energy planning. The outcome will be feedback on the SEMANTCO tool and user needs	June 2013	Presentation of SEMANTCO, the partners and the tool. PowerPoint	Ramboll
Workshop	Workshop with Copenhagen Municipality, Copenhagen Energy, Copenhagen City & Port Development and Region Zealand. The outcome will be feedback on the SEMANTCO tool and user needs	June 2013	Presentation of SEMANTCO, the partners and the tool. PowerPoint	Ramboll
2014				
February				
Workshop	Meeting with secretary of the urban planners architects association of Catalonia	Feb 2014	Discussion, planning of workshop in section 2.3	FORUM
Workshop	Meeting with PIREEB representatives (Platform for the promotion of energy refurbishment of buildings in the Bages county).	Feb 2014	Presentation of SEMANTCO, possible collaboration	FORUM
March				
Workshop	Meeting with an EPSEM representative.	March 2014	Presentation of SEMANTCO, possible collaboration	FORUM

3 EXTERNALLY ORGANISED EVENTS

3.1 Introduction

As well as organising and running the events described in the previous chapter, the partners presented the project outcomes at a large number of external events. The following chapter starts by describing the written materials produced in order to support such activities and follows with a detailed catalogue of the activities conducted during the course of the project.

In addition to the work described in this chapter, there has been major effort put into the production and maintenance of the SEMANTCO website. This was described briefly in the original dissemination plan and has been presented in more detail in subsequent annual activity reports.

The website is not addressed in the current document due to the major effort being made to produce a second, more user focused website during the final three months of the project. This work will be described in Deliverable 7.6: *Development of an Energy Services Platform* portal, scheduled to arrive in month 39 of the project.

3.2 Materials supporting dissemination

In order to obtain the desired level of impact from attendance at events, certain supplementary materials have been produced during the course of the SEMANTCO project. These include:

- Various brochures and flyers to publicise the holding of the SEMANTCO hosted events described in Chapter 2.
- A postcard flyer to be circulated at networking events and meetings. This postcard has been designed to give a snapshot of the project encouraging those reviewing it to visit the SEMANTCO website for further information and/or sign up to the dissemination network for further information.
- Leaflets have been designed at the start of the project and then updated as the tool and project has progressed. These have been used to give further details of the SEMANTCO project where the postcards have not been sufficient.
- Various posters have been produced along the lifetime of the project presenting the results obtained to specific target audiences. One of these is on a portable banner stand and has been used to provide a backdrop and platform to disseminate the SEMANTCO project at various conferences and events.
- As well as software demonstrators using actual versions of the running SEMANTCO integrated platform, a power point demo was created and presented as part of the stand at ICT 2013 in Vilnius².

A picture of the postcard can be found in figures 5 and 6, and of the banner stand in use in figure 7. Figure 8 contains an example of another poster developed to present SEMANTCO at the European Semantic Web Conference 2014.

² This can be found via the current SEMANTCO website, or at https://docs.google.com/file/d/0B9CkvqPnyU_qYWZuMGprUHVRNkk/

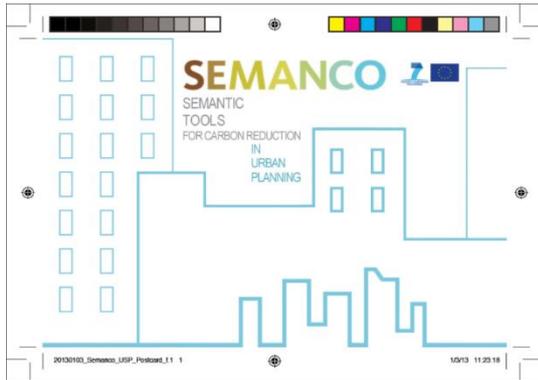


Figure 5. Front of postcard

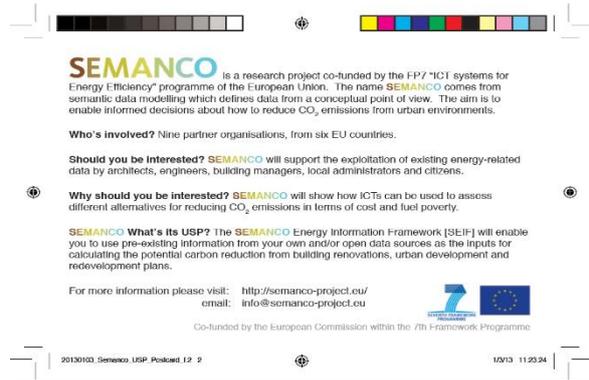


Figure 6. Back of postcard



Figure 7. SEMANTCO Banner stand at Greenbuild Expo, 2013

SEMANTCO

www.semanco-project.eu

SEMANTIC TECHNOLOGIES FOR CARBON REDUCTION IN URBAN PLANNING



PROJECT

The purpose of SEMANTCO (www.semanco-project.eu), is to provide **semantic tools** to stakeholders involved in urban planning to help them make informed decisions about how to **reduce carbon emissions in cities**.

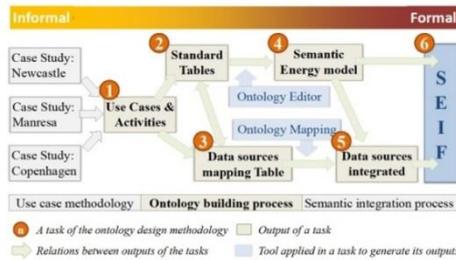
An **integrated platform** has been developed which includes a set of tools to **visualize and analyse semantic data** interlinking various data sources (cadastre, census, building typologies, climate, GIS). This data integration is carried out through a **Semantic Energy Information Framework (SEIF)** developed in the project.

The platform has been tested in demonstration scenarios at **three cities: Copenhagen (Denmark), Newcastle upon Tyne (UK), and Manresa, Barcelona (Spain)**.

ONTOLOGY BUILDING PROCESS

In the SEMANTCO Project an **ontology building process** has been devised –based on existing methodologies– taking into account the context of **data integration and federated access**. The process is composed of six steps described above.

1. **Capturing the base terminology** taking into account the users' perspective obtained from **use case specifications**
2. **Building initial vocabulary** based on international standards, R&D projects, official classifications
3. **Mapping data sources** to the informal vocabulary
4. **Ontology coding** using an **Ontology editor** created in the project to facilitate the ontology editing process
5. **Data integration** using a **RDF wrapper** (Sesame/Ontop) based on **R2RML mappings** created with an **Ontology Mapping tool** created in the project
6. **Ontology evaluation**. T-box intelligibility, mapping compliance, computational efficiency

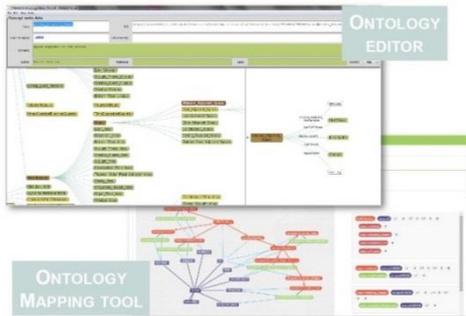


TECHNOLOGICAL OUTPUTS

Two tools have been created in the project to facilitate the ontology design process: **Ontology Editor** and **Ontology Mapping**.

The **Ontology Editor** hides the complexity of coding ontologies in **DL-Lite_A** formalism, facilitating the collaboration between **ontology engineers** and **domain experts**. The SEMANTCO ontology, recently published, is composed of **1042 classes, 849 properties, and 7196 axioms**.

The **Ontology Mapping** tool helps users to **integrate data sources** supporting the creation of a **R2RML mapping file**. It is a **generic tool** which can hold any OWL ontology. Data sources have been integrated with **221 R2RML mappings**.



PARTNERS

ARC La Salle Engineering and Architecture (Project Coordinator) SPAIN • University of Teesside UNITED KINGDOM • Centro Internacional de Métodos Numéricos en Ingeniería SPAIN • Politecnico di Torino ITALY • Hochschule Albstadt-Sigmaringen GERMANY • Agency9 SWEDEN • Ramboll DENMARK • Foment de la Rehabilitació Urbana de Manresa SPAIN • National Energy Action UNITED KINGDOM



SEMANTCO is being carried out with the support of the European Union's FP7 Programme "ICT for Energy Systems" 2011-2014, under the grant agreement number 287534.

European Semantic Web Conference (ESWC) • 27 - 29 May 2014 • Crete, Greece

Figure 8. SEMANTCO poster, European Semantic Web Conference 2014

3.3 External events attended

Table 2 below lists the externally organised events at which SEMANTCO has been demonstrated. In each case the event, when it was held and which SEMANTCO partner was responsible for presented at the event is given. The primary timescale of this table is months 1-36 of the project. Other papers and events might happen from months 36-39. The three events listed for this time period in table 2 are confirmed as definitely going to happen.

Table 2. Attendance at external events

Promotional Activity	Type of Activity	Details	Date/ need to action	Engagement (presentation, display stand, poster, etc.)
2011				
October				
ECTP/E2BA Conference	Presentation	Presentation of initial ideas behind the SEMANTCO project	4 th , 5 th October 2011	Presentation
2012				
June				
Eurekabuild2 International Brokerage event	Networking/ Discussion	Presentation of ideas of project	12 th June 2012	Poster presentation
Potential Synergies on ICT & Energy Efficiency	Networking/ Discussion	Exchange meeting with EU projects working on similar issues as SEMANTCO	14 th June 2012	Participation in discussions
Erasmus energy forum	Networking	Attendance at forum by FUNITEC	15 th June 2012	Participation in discussions
July				
Information workshop for EU R&D Funding in the field of ICT by 7th Framework programme (FP7)	Networking	Attendance by HAS	9 th July 2013	Participation in discussions
2013				
January				
Presentation of pilot SAP estimation tool	Demonstration	Presentation by NEA and UoT as part of the International conference for affordable sustainable housing in Sheffield	7 th January 2013	Tool presented, stakeholder feedback regarding it gathered.
Potential Synergies in ICT & energy efficiency	Networking/ discussion	Second exchange meeting with EU projects working on similar issues as SEMANTCO. Attended by FUNITEC.	16 th January 2013	Participation in discussions
March				
NEA, House of Lords networking	Networking	NEA hosts an annual networking event at the UK houses of parliament. Over 200 high profile guests	6 th March 2013	Leaflets providing a basic introduction to SEMANTCO were distributed to delegates

event		attended the event, including Members of both Houses of Parliament; key representatives from the energy efficiency industry; voluntary sector partners and private sector supporters of NEA.		and the programme was discussed by NEA staff during networking opportunities.
May				
Green Build Expo, Manchester	Exhibition stand and article	http://www.greenbuildexpo.co.uk/ The UK's newest sustainable building and refurbishment event, an essential and informative event for the construction industry covering everything from training opportunities and renewable technologies to sustainable materials and legislation updates.	8 th -9 th May 2013	NEA negotiated a complimentary exhibition stand. SEMANTCO was demonstrated via a banner stand, postcards and an article which was published in the event's "Green Build" magazine. This magazine was circulated to approximately 2000 delegates at the Green Build Expo. NEA also provided a presentation to 12 attendees in a workshop format with PowerPoint presentation.
RTPI Conference, Newcastle upon Tyne	CPD Conference Presentation	Presentation on "Adding Value through design Guidance" and the role of decision-support tools in master planning (Crilly 2013a) Presentation part of the Delivering Quality Environments RTPI Conference, St James Gate, Newcastle upon Tyne 15th May.	15 th May 2013	Professional conference presentation by UoT to group of professional town planners and urban designers. Hosted by the Royal Town Planning Institute and suitable for Continuing Professional development certificate. Discussion on the use of tools in master planning and professional networking.
NEA Business Supporter Group meeting	Presentation to approx. 30 delegates	Members of the Group are businesses with an interest in the domestic energy efficiency market including energy supply companies, scheme managers and consultants, boiler manufacturers, insulation and central heating installers and component suppliers, land developers and manufacturers of renewable technology products.	22 nd May 2013	Amit Mhalas, UoT presented the SAP tool used for the SEMANTCO project.
18 th Construmat	Presentation	Power point presentation describing SEMANTCO given	22 nd May 2013	Presentation by CIMNE
IREEN Coordination Day, Amsterdam	Workshop session	The IREEN Coordination Action Day was attended by the NEA held at VU University Amsterdam. Amsterdam, the Netherlands.	28 th May 2013	Invitation of NEA by Manchester University to a workshop session designed to discuss the role of ICTs in developing future cities and landscapes. Subsequent networking opportunities.
June				
SEMCity 13	Conference	Held in Madrid	12 th , 13 th June 2013	Attended by HAS

September				
NEA Annual Conference – September (approx. 250 attendees)	Conference	Annual 2 day conference held every year to discuss up to date topics around fuel poverty. Taking place in Scarborough	15 th -17 th September 2013	NEA were given an exhibition stand free of charge. A member of staff disseminated SEMANTCO over the full two days.
Designing effective area-wide retrofit; scaling-up through better data, planning and delivery Conference, Leicester	Conference presentation and professional workshop session	Presentation on ‘Retrofit a whole systems approach’ (Crilly 2013b) to low energy refurbishment.	28 th September 2013	UoT Conference presentation and workshop with professionals dealing with large scale retrofitting projects for energy efficiency. Comparison with existing sap tools and available data sources.
October				
Meeting with AVS representatives	Stakeholder Engagement	Presentation of SEMANTCO to a regular meeting of the association	8 th October 2013, 10 th December 2013.	Presentation given by FORUM. Some questions raised from the presentation and quite a high interest on the future outputs of the project was detected among the audience.
ConVR, London	Conference	Presentation of SEMANTCO as an invited speaker	30,31 st October 2013	Presentation given by FUNITEC.
November				
ICT2013 event , Vilnius, Lithuania	Exhibition	The event brought together many stakeholders involved in ICT tool development. http://webcast.ec.europa.eu/eutv/portal/archive.html?viewConference=21234&catId=21165	6 th -8 th November 2013	SEMANTCO had an exhibition space at the event to disseminate technical developments and outputs from the tool. Leaflets and video still images were shared at the event to raise the profile of the programme. The exhibition attracted interest from stakeholders worldwide including members of the Horizon 2020 team. Several SEMANTCO partners involved.
2014				
January				
AESOP (Association of European Schools of Planning: Thematic Group on		Conference presentation with accompanying paper and workshop discussion on “Visualising Complexity & Precautionary Planning”. (Crilly <i>et al</i> 2014) Part of the 12 th meeting of AESOP - Confronting Urban Planning and Design with Complexity: Methods for	16 th – 17 th January 2014	UoT presentation of insights from SEMANTCO case studies to professionals interested in planning.

Complexity and Planning), Manchester		Inevitable Transformation		
SEMANTCO presentation to ICAEN representatives	Possible collaboration	FUNITEC and FORUM presented the project and the platform to a group of representatives from the Catalan Institute of Energy during a technical meeting held with the purpose of gathering information from them to feed the platform.	16 th January 2014	PowerPoint and Live demo of the platform.
February				
SEMANTCO presentation at KIC-InnoEnergy	Possible exploitation	The purpose of the presentation was to select the projects that KIC will be able to support in order to become a marketable solution. 10 projects were invited to a 10 minute presentation followed by 10 minute questions.	25 th February 2014	Presentation by FUNITEC
March				
Evening reception in the House of Lords	Parliamentary event	Opportunity to disseminate the SEMANTCO project to MP's and NEA's Business Supporter Group members	12 th March 2014	An NEA member of staff brought postcards and set up meetings with key contacts/MP's.
Eco Build	Exhibition	Ecobuild is the biggest event in the world for sustainable design, construction and the built environment. http://www.ecobuild.co.uk/page.cfm/link=1	4 th – 6 th March 2014	NEA exhibited alongside one of their Business Supporter Group members at no extra cost for the stand. A member of NEA spoke to 4 trade magazine representatives who were interested in featuring an article on SEMANTCO. These will be followed up throughout the project.
April				
Renewable Energy Marketplace conference		Renewable Energy Marketplace conference http://www.regensw.co.uk/renewable-energy-marketplace/exhibit REM is the South West's biggest energy event covering renewable energies, efficiency measures and generation. The event is attended by over 1200 landowners, businesses, community groups, owners of public	8 th April, Exeter 2014	NEA were offered a discounted rate to exhibit at this conference. David Lynch, NEA gave full demonstrations of the project to 6 interested delegates throughout the day as well as giving out postcards.

		buildings, investors and the general public. Specific business sectors include construction, tourism and renewable energies.		
May				
Green Build Expo, Manchester	Exhibition	http://www.greenbuildexpo.co.uk/ Sustainable building and refurbishment event held in Manchester, an essential and informative event for the construction industry covering everything from training opportunities and renewable technologies to sustainable materials and legislation updates.	7 th -8 th March 2014	NEA negotiated a free exhibition stand and entry into awards that run alongside the event. There was also a speaking opportunity for David Lynch, NEA to speak about the SEMANTCO project. Visitors to the stand represented a range of sectors including architects and the built environment, energy professionals and Local Authorities.
NEA UK SEMANTCO Event	Workshop	1 day workshop. This is evaluated in another report but the banner stand was used and members of NEA presented alongside UoT and other speakers	21 st May 2014	NEA Chief Executive Jenny Saunders opened and chaired the event and 42 delegates heard from a range of speakers representing NEA, The University of Teesside, Ramboll, East Midlands Housing Association and DKS Architects. Round-table discussions encouraged conversations around the SEMANTCO tool including usability and availability of data, usability of the tool itself and general feedback from the tool and how it would be useful to planners. The event attracted Local Authority representatives, Academics, Housing Associations, Architects, and Private Companies. NEA was delighted with the event and delegate feedback was extremely positive.
11 th EWSC 2014	Conference	The Extended Semantic Web Conferences is a major venue for discussing the latest scientific results and technology innovations around semantic technologies.	27 th May 2014	Poster presentation of SEMANTCO given by FUNITEC
June				
TFI Annual Research Day	Conference	The TFI is a major internal event at Teesside university with many lecturers and PhD students attending.	3 rd June 2014	The progress of SEMANTCO was presented. UoT event.

European Construction Technology Platform	Demonstration	Presentation to the European Construction Technology Platform 6th Conference.	17 th June 2014	Presentation given by FUNITEC.
Sustainable Energy Week	Stakeholder Engagement	A non-scientific engagement of children and parents as part of Sustainable Energy Week. Conducted in Manresa by FORUM.	30 th June 2014	A report is available online at: http://arc.housing.salle.url.edu/semanco/blogs/manresa/2014/07/01/semanco-with-children-in-the-energy-week/
July				
NEA Fuel Poverty Forum, Nottingham	Conference	A series of events organised by NEA and takes place in different regions of the UK (approx. 30-50 attendees). The theme for each differs but focuses primarily on energy poverty providing a policy update. Attendees include representatives from Local Authorities among other interested stakeholders.	3 rd July 2014	David Lynch, NEA, brought some postcards and provided an update on SEMANTCO asking attendees to get in touch for further information or to sign up to the dissemination network.
NEA Business Supporter Group meeting	Stakeholder meeting of approx. 30 delegates	Members of the Group are businesses with an interest in the domestic energy efficiency market including energy supply companies, scheme managers and consultants, boiler manufacturers, insulation and central heating installers and component suppliers, land developers and manufacturers of renewable technology products.	9 th July 2014	David Lynch, NEA provided an update on the SEMANTCO project alongside another presentation and asked members to contact him for further information or to be added to the dissemination network.
August				
International Symposium on Energy Challenges and Mechanics	Conference	2nd International Symposium on Energy Challenges and Mechanics, to be held in Aberdeen.	24 th August 2014	30 minute presentation by UoT of a paper entitled Semantic Urban Energy Modelling presented as part of an energy future session. ³
September				
NEA Annual Conference – September (approx. 250 attendees)	Conference	Annual 2 day conference held every year to discuss up to date topics around fuel poverty. Taking place in Scarborough	15 th -17 th September 2014	NEA will be disseminating the SEMANTCO programme on an exhibition stand provided free of charge. As part of this activity delegates will be provided with a demonstration of the tool.
October				
2 nd Sustainable	Conference	A conference focusing on energy efficiency at	1 st – 3 rd October	SEMANTCO related paper from UoT

³ While this conference, and some others in this table, is technically academic it features a large proportion of industry stakeholders and so is included here.

Places Conference		building, neighbourhood, district and city level. To be held in Nice.		accepted to the EC DG CONNECT 2nd EeB KPIs Workshop.
November				
ConVR 2014	Conference	Annual conference on the application of virtual reality to construction, to be held in Sharjah.	16 th – 18 th , November	SEMANTCO related paper to be presented by UoT
Smart City Expo World Congress	Conference	Smart City Expo World Congress is the most important event that gathers in one place city representatives, institutions, academic and thought leaders, research centres, industry and entrepreneurs with major decision-making power.	18 th -20 th November	Presentation of the project by FUNITEC, CIMNE and FORUM

4 ACADEMIC PUBLICATIONS

4.1 Introduction

As well as the stakeholder dissemination activities conducted within the SEMANTCO project, the project has produced a number of scientific outputs. Indeed most of the work packages within the project have an attached deliverable which corresponds to a publication. Due to the time delay involved in finalising the acceptance and publication of scientific papers, and in particular those for journal publications, these plans have yet to be entirely completed and some scientific publications remain planned rather than actual.

4.2 Achieved Publications

Table 3 below lists those academic publications which have been definitely achieved by the SEMANTCO partners in the first three years of the project. The final two papers are due for publication after this date, but have been accepted before it and so are included here. It is expected that some additional workshop and conference papers might be produced during the final three months of the SEMANTCO project but these are not listed in this document. The current SEMANTCO plans for journal papers are discussed in section 4.3 below.

Table 3. Achieved SEMANTCO academic publications

Publication outlet	Type of contribution	Details	Date
2013			
June			
Proceedings of the 13th International Conference on Web Intelligence, Mining and Semantics	Conference Paper	Data Integration Driven Ontology Design, Case Study Smart City G. Nemirovski (HAS), A. Sicilia (FUNITEC), A. Nolle (HAS), I. Ballarini, V. Corrado (POLITO)	12th June 2013
August			
RapidMiner Community Meeting And Conference	Conference Paper	An Approach for Accessing Linked Open Data for Data Mining Purposes Andreas Nolle, German Nemirovski (HAS) Alvaro Sicilia, Joan Pleguezuelos (FUNITEC)	27th – 30th August 2013
September			
ICT for Sustainable Places International International Conference	Conference Paper	An Approach for Accessing Linked Open Data for Data Mining Purposes Andreas Nolle, German Nemirovski (HAS), Alvaro Sicilia, Joan Pleguezuelos (FUNITEC) Paper presented to the 2nd Workshop on EEB Data Models	9th September 2013
ICT for Sustainable Places International International Conference	Conference Paper	Visualising the 'Big Picture': ICT tools and indicators for urban design Tracey Crosbie, Michael Crilly (UoT) Paper presented to the 1st Workshop on EeB KPIs	9th September 2013

7th International Conference on Advances in Semantic Processing	Conference Paper	ELITE: An Entailment-based Federated Query Engine for Complete and Transparent Semantic Data Integration Andreas Nolle, German Nemirovski (HAS)	29th September 2013
7th International Conference on Advances in Semantic Processing	Conference Paper	ClickOn: An Editor for DL-Lite based Ontology Design Michael Wolters, German Nemirovski, Andreas Nolle (HAS)	29th September 2013
2014			
January			
12th Association of European Schools of Planning Conference	Conference Paper	Visualising Complexity and Precautionary Planning Tracey Crosbie (UoT), Michael Crilly (UoT)	16th January 2014
September			
The 8th International Conference on Web Reasoning and Rule Systems	Conference Paper	Efficient Federated Debugging of Lightweight Ontologies Andreas Nolle, Christian Meilicke, HeinerStuckenschmidt and German Nemirovski (HAS)	15th September, 2014
October			
2nd Sustainable Places Conference	Conference Paper	Implications of open access data for low cost KPIs measuring energy efficiency Martin Carpenter; Tracey Crosbie; Michael Crilly; Nashwan Dawood; Amit Mhalas (UoT)	1st – 3rd October, 2014

4.3 Intended journal publications

The following section lists the set of journal papers which the SEMANTCO project has identified as being worthwhile to produce and are actively attempting to get published. Since the process of writing a journal article, finding an appropriate journal and passing the reviews can take many months to complete most of these articles are not expected to achieve publication during the lifetime of the SEMANTCO project.

Indeed some of them might prove to require further research before they achieve the level of results required for publication. Target journals have been identified for all of these potential publications.

A journal article describing the work to structure the ontologies and data sources conducted in work package 3, and especially in Deliverable 3.6 has been led by Polito and has been accepted for publication in the journal “Sustainable Cities and Society”.

A paper deriving from the theoretical work in ontologies, such as the editor and querying mechanisms. This work was principally conducted in work package 4 and the paper is being led by HAS. This work involved in writing this paper is substantially complete. Efforts to find an appropriate publication outlet are ongoing.

Work on the following journal articles is expected to commence during the final months of the SEMANTCO project, although it is unlikely to be published until after the formal end of the project:

- A paper describing the technological platform developed in work package 5 of

SEMANTCO. The platform integrates data from multiple sources and facilitates their interaction with a variety of energy assessment and simulation tools. It has been applied in demonstrations scenarios in three cities, Manresa (Spain), Newcastle (UK) and Copenhagen (Denmark). This paper will be led by FUNITEC.

The following journal paper is firmly planned, but work on it is not expected to finally commence until after the formal end of the SEMANTCO project:

- A paper describing the outcomes arising from the stakeholder evaluation work and business model development conducted as part of workpackage 6. This paper will be led by the University of Teesside.

Finally it is hoped that both the remaining work conducted in work package 2 and the work conducted in work package 8 might in the future support additional journal articles.

5 WRITTEN DISSEMINATION

The attendance at events, and face-to-face contact with external stakeholders, formed a crucial and very successful element of the work undertaken within Task 6.5. In addition many written dissemination activities were undertaken. These fell into the following groups:

- The SEMANTCO newsletter and dissemination network,
- Publishing non-academic articles in local press/relevant trade magazines.

The current chapter discusses the work undertaken on both of these elements.

5.1 The SEMANTCO newsletter and dissemination network

One major output from all of the stakeholder events listed in chapter 3 has been the development of the SEMANTCO dissemination network. This is a group of contacts, spread over academia, local government and relevant companies, who have identified themselves as being interested in receiving regular updates regarding the SEMANTCO project.

The dissemination efforts in the final year of the SEMANTCO project, and in particular the stakeholder events organised as part of Deliverable 7.5, have raised the number of individual members to around 300 individuals, coming from about 190 unique organisations. Roughly 85 individuals came from each of the commercial, government and research sections, with the remainder coming from non profit organisations. This represents a considerable increase during the final year of the project - at the time of writing the original dissemination plan, at the end of month 24, there were only 145 individual members drawn from across 86 individual organisations. The stakeholder events described in chapter 2 above were a major contributor to this.

In terms of countries, there has been a natural focus on those countries for which SEMANTCO had case study areas – Spain, Denmark and UK– and so more demonstrations have been held in these areas. Interest from outside these areas, both via the invited workshops described in section 2.3 above and by the ability of people to sign up online has none the less ensured a reasonable number of members from outside these areas. In consequence, 100 network members come from each of the UK and Spain, 50 from Denmark, and 50 from other countries.

This dissemination network has been instrumental to spread the SEMANTCO newsletters. Overall, six newsletters were produced and sent to the members of the network. Each newsletter included the following topics:

- SEMANTCO news,
- Comprehensive update on the recent, exciting SEMANTCO technology developments,
- Forthcoming highlights and project presentations. As part of the work of WP7 the newsletters were circulated to the dissemination list and made available via the SEMANTCO website.

These newsletters formed a major component in the task of keeping the dissemination network membership both interested in and knowledgeable about the progress of the overall SEMANTCO project. An example of newsletter can be seen in figure 9 below.



Welcome to the 5th edition of our SEMANTCO Newsletter. SEMANTCO is deep into its third and final year – the project's implementation phase – and there is now a significant emphasis on disseminating SEMANTCO's results and preparing to exploit the tools that we have developed. In March, the 8th general meeting of the SEMANTCO consortium took place in Lulea, Sweden, hosted by project partners Agency 9. Dissemination and exploitation were the main discussion points on the agenda with a number of significant events being arranged to promote SEMANTCO and the project's potential over the coming months.

At the end of May, partners from the consortium hosted three separate workshops in the UK, Spain and Denmark. In total these workshops featured around 130 delegates from a mixture of academic, government and commercial stakeholders and served twin purposes. Firstly they provided some of our key stakeholders with detailed insight into the project, the tools that have been developed and how they can be exploited. Secondly they served to provide guidance for the final stages of the development of the SEMANTCO platform, maximising the real world relevance of the results of the project. You can read more about each workshop below.

Summer 2014 will prove to be an exciting and dynamic season for the project and I hope to share it with you over coming months!

Figure 9. The front of SEMANTCO Newsletter number 5

5.2 External non scientific publications

In addition to the non scientific publications directly organised by the SEMANTCO project, the project has published a series of articles in external publications. In addition to those already published and described in the table, the project intends to target several additional publication opportunities during its remaining months. These efforts are currently ongoing.

Table 4. Completed, external written dissemination items

Name of Magazine	Type of Activity	Details	Date	Article description
2014				
March				
Plataforma Tecnológica de la Construcción (PTEC) Newsletter	Newsletter article	A short article describing SEMANCO . available online here: http://www.plataformaptec.es/ver-noticia.php?id=1487	5 th March 2014	Article written by FUNITEC.
April				
'Professional Heating and Plumbing Installer'	Trade Magazine	(1/04/14) circ figures 70548 advertising value £2943	April 2014	NEA was picked up in this magazine as part of advertising NEA's attendance at Greenbuild.
May				
'UK Construction' magazine	Trade Magazine	1/05/14 circ 5000 advertising value £1583	May 2014	NEA sent a press release out and it was featured in this magazine within an article advertising Green Build EXPO.
preferies.es	Trade Magazine	Article describing SEMANCO published in trade magazine preferies.es available online at: http://www.preferies.es/index.php?d=secciones&sec=5&n=11	21 st May 2014	Article written by FUNITEC and
Carbon Action News (CAN) magazine	CAN's magazine	Carbon Action News is the news magazine of the Carbon Action Network published three times a year by the CAN National Secretariat and circulated to local authority domestic energy efficiency, climate change and fuel poverty officers as well as other interested parties throughout the UK. http://www.can.uk.net/	The article included an overview of the SEMANCO project and asked for people with an interest in the project to contact NEA to be added to the dissemination network.	Article on SEMANCO included in the spring 2014 edition, issue 39, page 4.
June				
Regio 7	Trade Magazine	Short article describing SEMANCO published in the trade magazine Regio 7	2 nd June 2014	Article written by FORUM.
NEA Focus	NEA's internal magazine	NEA included a SEMANCO feature in the NEA Focus Spring and summer editions	Both Spring and Summer editions.	The spring edition (Feb 2014) focussed on the events SEMANCO had been disseminated at including EcoBuild and the REM conference. The summer edition focussed on the Newcastle event.

6 EVALUATION OF DISSEMINATION ACHIEVEMENTS

6.1 Anticipated outputs

The dissemination plan originally laid out on in month 6 of the SEMANTCO project, and developed through the course of the project, presented concrete targets for the dissemination in the SEMANTCO project. In order to achieve these dissemination objectives, the project will target a number of specific dissemination outlets per year, as outlined in the following table.

Table 5. SEMANTCO dissemination targets

	Year 1	Year 2	Year 3
Scientific publications	-	2	6
Scientific Conference/workshop	2	4	4
Non-scientific publications	2	2	4
Non-scientific conference/workshop	-	4	6

In addition to this a table of expected journal publications was presented in the dissemination plan, and this is given in table 6 below.

Table 6. Expected SEMANTCO Journal Publications

Publication	Lead Partner	Delivery Date	Target Journals
Based on results from implementation of first iteration of the project.	CIMNE	October 2013	Energy and Policy or Energy and Buildings
Based on the outcomes of WP3, describing the ETL process to migrate data to the ontology repository; a second publication will describe the work done in structuring the energy data. D3.6	POLITO	July 2013	Energy Policy or Sustainable Cities and Society
Based on results from D6.1, the stakeholder requirements analysis.	UoT	July/ August 2013	Energy Policy or Energy and Environment
Based on results of WP4, D4.7 will be the publication of a technical paper describing the implementation of the platform and a paper explaining the creation of	FUNITEC	Feb 2014	To be indicated

the semantic energy model.			
D2.6 will be a publication of the outcomes of WP2 (Case Studies).	CIMNE	August 2014	To be indicated
D5.7 will be a publication of the outcomes of WP5 (Integrated Tools).	FUNITEC	August 2014	To be indicated
D6.6 will be a publication of the outcomes of WP6 (Enabling Scenarios for Stakeholders).	UoT	August 2014	To be indicated
D8.5 will be a publication of the outcomes of WP8 (Implementation).	CIMNE	August 2014	To be indicated

6.2 Evaluation of achieved SEMANTCO dissemination results

Table 7 summarises the numerical results achieved in terms of the dissemination results achieved, along with the targets from table 5.

Table 7. Dissemination results against targets

	Year 1		Year 2		Year 3	
	Achieved	Target	Achieved	Target	Achieved	Target
Scientific publications	0	-	6	2	3(*)	6
Scientific Conference/workshop	3	2	5	4	8	4
Non-scientific publications	0	2	0	2	7(*)	4
Non-scientific conference/workshop	1	-	6	4	12	6

As can be quickly seen from this table, the non-scientific dissemination efforts of SEMANTCO have been highly extensive, achieving results comfortably matching those planned for in the dissemination plan, and in the case of event attendance and presentation considerably exceeding them. The production of non scientific articles was displaced until the final year as it wasn't until then that the prototype was developed fully enough to use to illustrate such articles, but the planned numbers have been nearly reached already and should be exceeded by the end of the project.

A further confirmation of the success of these activities has been the growth of the SEMANTCO dissemination network to over 300 members. Achieving this required extensive work. Overall, the non-scientific dissemination of SEMANTCO must be accounted a success story.

The evaluation in terms of scientific outputs is more mixed. As with the non-scientific

dissemination, the raw numbers in terms of both scientific conferences attended and workshop/conference papers produced have both been outstanding.

The area in which the outcomes of the project against the planning are more questionable is the production of journal papers. The original plan for three journal papers to be published in 2013 has not been met. However, the time scales involved in doing the work, and in getting a journal paper published, always meant that this was a very ambitious target.

The current plans for journal papers described in section 4.3 above, while numerically smaller than the original plans, will still represent a substantial achievement in terms of research outputs from the SEMANTCO project.

7 CONCLUSIONS

7.1 Contribution to overall picture

The work presented in this document represents the total dissemination effort achieved by the SEMANTCO project during the duration of the project. As described in chapter 6, this has been quite relevant, with the non-scientific dissemination a notable success. Indeed the only area in which the project has fallen short of its original goals has been the production of journal papers and even here a healthy number of publications are expected to be ultimately produced.

The work in terms of non-scientific dissemination has provided two major benefits to the SEMANTCO technological outputs, namely, the platform integrating semantic energy data and analysis tools. Firstly, and crucially, it has meant that the development of the software during the course of the project has taken account of the needs of actual stakeholders outside the project, and has potential future relevance. Secondly the dissemination network developed as part of this take represents a very valuable resource for any potential future exploitation of the SEMANTCO project.

7.2 Impact on other WPs and Tasks

The principle impact of Task 6.5 has fallen on two major work packages. The feedback from the various interactions with the external stakeholders provided feedback to the development of the tools within work package 5, thus helping to ensure their universal relevance. In addition the work in Task 6.5 provided a major contribution to the work of work package 7, in particular directly for Task 7.2 by including the capture of many members for the dissemination network.

7.3 Contribution to demonstration

The work reported in the current deliverable was obviously critical to the project demonstration activities in that it is through this work that they were made to people outside the SEMANTCO project. In addition, the feedback derived from the demonstrations to other stakeholders provided valuable feedback to the development of the results within SEMANTCO, and helped to ensure the universal relevance of the SEMANTCO results.

7.4 Other conclusions and lessons learned

The dissemination work within SEMANTCO provided many small conclusions and lessons learned, each of which were fed back into the development of the project in order to ensure that it retained a more universal relevance than that provided by the specific case studies formally treated within the project.

It also, through efforts such as the collection of the dissemination network, laid substantial foundations for any future exploitation of the results of the SEMANTCO project.

8 APPENDICES

APPENDIX A. Barcelona Workshop –main section of report

The following appendix contains only the main section of the report published after the Barcelona workshop. The full version of this report, which contains extensive appendices of its own, can be found in the SEMANTCO website.⁴

A.1 Introduction

The SEMANTCO Workshop, ‘Analysing and Visualising Energy Related Data in our Buildings, Towns and Cities’ was held in Barcelona on 11th-12th, April 2013. The purpose of the Workshop was to bring together the community of researchers working on the application of ICT to energy efficiency to discuss three closely related Thematic Lines:

- Theme 1. Energy Data for Urban Planning: Multiple Representations of Energy Information
- Theme 2. Interactive Interfaces of Energy Data Visualization and The Pan-European Context
- Theme 3. Developing Business Models Based On New Energy Services

These transversal themes, outlined in detail below, are of concern to researchers in a number of projects.

Thirty eight participants attended the Workshop. Representatives of sixteen projects participated actively by delivering presentations outlining their work and the relevant aspect of the projects within one or more of the Thematic Lines, and/or by participating in the discussions. Details of the participants and the project presentations’ abstracts are given in Appendix 1 and 2, respectively. The Programme is given in Appendix 3 and presentation content, along with other related information, can be found at the Workshop Blog: <http://semanco-visualization-workshop.blogspot.com.es/>

8.1.1 Theme 1: Energy Data for Urban Planning: Multiple Representations of Energy Information

Urban planners and others who hold a stake in city-planning decision making, such as architects, consultants, politicians and citizens, among others, need comprehensive information from different realms in order to take informed decisions. Typically, they base their decisions on public (open data) and proprietary information obtained from disparate sources (regulations, data portals, etc.) and provided by different stakeholders (consumers, institutions, energy providers...). Integrated data environments which combine these different data would be helpful to understand the multidimensionality of the problems they are tackling, including energy efficient planning.

The data collected from different sources need to be modelled in a way that can be later analysed and visualized according to the needs of different stakeholders.

⁴http://arcdev.housing.salle.url.edu/semanco/SEMANTCO_Barcelona_Workshop_Outline_Discussion_Document_Public_Version_FINAL.pdf

Related topics:

- Combining different information sources.
- Sourcing energy data from consumers.
- Sourcing energy data in real time.
- Modelling energy demand side/smart grids.
- Energy performance indicators.
- Energy simulation.

8.1.2 Theme 2: Interactive Interfaces of Energy Data Visualization and the Pan-European Context

The end user requires that energy related data be presented in such a way that they can understand it and, furthermore, can make decisions based upon it. Additionally, the data will often need to be exported to other tools and be capable of undergoing further processing and review. The data needs to suit the requirements of the different simulation and analysis tools used in each country. Also, the data needs to be presented to suit the local/national regulations being applied in different EU countries. In addition, the data needs to be presented in environments such as online geographic systems (Google Maps, GIS, Bing maps, OpenStreetMap, etc.), as well as in other visual representations which facilitate the understanding of the complexity of the relationships between datasets. This raises issues of appropriateness of data visualization, complementary visualizations (diagrams, tables, 3d models, etc.) and different data platforms (e.g. portable devices).

Related topics:

- Visualizing energy data.
- Cross-national energy data descriptions.
- Energy assessment.
- Developing tools and platforms.

8.1.3 Theme 3: Developing Business Models Based On New Energy Services

From the analysis of the energy related data, strategies for intervention can be derived and applied in different realms with the common purpose of reducing CO₂ emissions. These functionalities can give rise to new services and their associated business models. The platforms which provide access to these services need to be effective in achieving real CO₂ reductions they must be implementable in a competitive market environment. This requires an assessment to be undertaken to understand the potential value of tools to end users and their willingness to pay, as well as questions of the political value of tools for CO₂ emissions reduction from the built environment.

Related topics:

- Strategies for CO₂ reduction.
- Business models.

A.2 Discussion

Following the presentations in each Thematic Session, as per the Programme (see Appendix 3), a list of issues was identified in a plenary discussion. These findings were used as the basis for a small group, round-table thematic discussion session. In each of the following sections describing the three sessions a list of these issues and points is presented, together with the summary of the round-table discussions in relation to them. **Points which were raised in the plenary discussion but which did not receive attention in the round-table discussions are**

included here in order to fully reflect the proceedings of the workshop discussions.

8.1.4 Thematic Session 1

8.1.4.1 Key Performance Indicators (KPIs):

KPIs emerged as important because:

- KPI selection affects data source selection
- KPI selection affects selection of computation methods
- Good selection of KPIs helps to make correct decisions and vice versa

How to calculate, to integrate different realms

The calculation of KPIs depends on the point of view from which the information is being evaluated. This is different between projects, as the focus may be on city plans, utilities, ESCOs, etc., and the particular KPIs chosen for the project, and hence the data requirements, are strongly influenced by this. In the identification of the best, most suitable KPIs – and, indeed, the most suitable simulation models – the scale of the project and the nature of the end user are also important issues: KPI's need to map onto the problems those users need to solve. In contrast to this, there is, arguably, a tendency in academic-led projects for the investigation to be driven by the data. Consequently, the KPI can be altered in order to reflect the availability of data.

An awareness of what has been done in other contexts is critical, to avoid reinvention and to make real progress. Reviews of existing achievements and of the relevant targets and user/stakeholder requirements (and proper identification of who stakeholders are) properly develops the KPIs and hence the data requirements.

This uncovers real and difficult issues around data availability. Not only is it required that data be accessed in secure modes, but also there may be data protection impediments to data access, due to either the nature of the data or the local laws in the particular EU country involved.

Measuring human behaviour and setting benchmarks for indicators remain challenges identified by the participants. Workshop participants recognised that:

- There exists no common benchmarks for such indicators (governmental policies is one of the factors)
- There are challenges of capturing the activities of humans with respect to energy consumption rate
 - Privacy and security issues
 - User profiling of users at different scales: humans(individuals and families)-buildings-city using socio-economic indicators

Furthermore, it is necessary to standardise the naming and classification of KPIs used in projects, tools and schema around ICT for energy efficiency.

Sharing KPIs across projects

It is critical to share knowledge about definition of KPIs as well as calculations. The projects participating in the workshop agreed to work together towards harmonising the KPIs across the different projects (same terms, same methodologies, etc.) in order to be comparable across

the projects/case studies. A KPI repository (wiki, ontologies...) is needed and could be handled by a research project or the European Commission.

Quantify KPIs as final output in projects

8.1.4.2 Data

Available, generated (simulated), captured (statistical projections).

There are difficulties in sourcing data and it is becoming more expensive to generate data. Concomitantly, it is recognised that the output analysis is only as good as the input data. Even though not all the data is standardised, projects are providing real intelligence as to how energy is consumed in historical buildings, the impact of seasonality and human behaviour. Therefore, it is recognised increasingly that it is important to share data. Furthermore, if we desire common uptake of tools/products, projects need to use same data where possible.

Data generated in one project to be used in another one

A repository such as CKAN.org might be useful for population by the research projects sharing its data schemas. This way, everybody would know which data are available and who owns which kind of data. A general purpose example is: <http://datahub.io>
To this end, the matrix originally circulated to generate pre-workshop discussion has been updated to highlight the connections and commonalities between projects – see Appendix 4.

Diversity of data

Computer/human generated data

Real data / reliability of data

Data protection rules at EU countries (difficult to get consumption private homes)

- Need for *anonymous* data about consumption of resources in private homes (support from state and utilities is needed)

8.1.4.3 Management systems

Centralized

Development of a cockpit for management of energy in building, districts etc. is a laudable, though ambitious, vision.

Distributed

Everything related to data collection becomes very much more complicated when systems are distributed. As systems are more efficient when centralised (as a generalisation), it is logical that technology be created for this type of system. Despite that, a lot of distributed systems are already implemented in many countries, and cheap technology to get data from these systems should be available until such time that the systems are updated/centralised.

Reinvented in every project

It is important to find ways to avoid reinvention: use what already exists. In the proposal phase we make SoA to set differences with other project. An alternative approach, a top-down process led by the Commission, would provide a list of existing projects to refer to them. Those who need to be convinced are users, not peers. But companies are reluctant to change. It would work with research institutes, not with companies.

8.1.4.4 Ontologies

Different meanings of the term

The term “ontology” might have different usages and meanings. In some cases, it is used as a simply as a synonym of “taxonomy” while in the context of Semantic Web technologies, an ontology implies a formal representation of a domain knowledge created with standard languages (e.g. RDF, OWL).

Different domains already in place (home...)

Upper ontologies (e.g. SUMO,...)

Sharing ontologies

It was perceived by the discussion groups that there is a problem with ontology development in that, once developed by individual projects or groups for particular purposes, there is a tendency for ontologies not to be shared. Furthermore, ontologies steer data and knowledge: it would be good to have these standardised across Europe. The eeSemantics forum is a good example of this trend towards sharing ontologies in specific domains.

8.1.4.5 Scales

Policies and rules to limit the energy consumptions in public spaces include:

- Monetary penalties
- Consumption restriction
- Incentives targeted both at individual users and facility owners

Home/building/district/city

As we move from building scale to urban scale (city, neighbourhood), KPIs should be developed to encompass environmental, social and economic vectors.

8.1.5 Thematic Session 2

8.1.5.1 Visualizing for understanding

To simplify complexity

Visualised data must suit users' needs; the role of visualization is to convert data into meaning. Data is visualized to facilitate users to understand the complexity of issues behind. Visualizing and understanding are inseparable.

To do this effectively and efficiently there must be a clear understanding of what is meaningful to users. The process of defining value must therefore occur early in the process and must involve the users/stakeholders. Furthermore, users should be involved throughout, so as to ensure value is maintained: in a similar sense to that encountered in consideration of KPIs above, it is important not to let the technical challenges and technical objectives lead the implementation of data visualization. As well as understanding the nature of the information that the visualisation tools should be bringing to particular users, consideration should also be given to the most effective interface design: for example, an interface should display only as many KPIs as are required by a given user and therefore should be capable of personalisation/adaptation. In addition, consideration should be given to whether mobile technology is likely to be required. Ideally, visualisation software should be multipurpose. Ultimately, data is monitored so that change may be brought about; to achieve effective change, users need to be presented not simply with numbers or even visualisation of numerical output. Rather, visualisations should offer incentives for change and motivation for users to change. In this connection, gamification – applying game techniques to non-game experiences – can be used in visualisation of energy data in order to drive user behavioural change. However, the ways in which consideration may be given to different types of user, with different levels of understanding and buy-in, involves an analysis and understanding of behavioural aspects of the end user. This remains a key challenge in the technological development of visualisation of energy information.

Visualization strategies are different for different domains, but the tools for visualizing buildings or transport networks, for example, must be common. There is a market in this regard for visualization tools.

Reaching out to citizens requires making energy information interesting. Using graphically interesting interfaces will increase support and engagement and will attract new groups e.g. young generation.

To enable/empower stakeholder's actions

Empowerment is a crucial concept in regard to energy efficiency, as it leads stakeholders to develop the interest to become contributors and positive actors.

8.1.5.2 User manual

How to use buildings properly (which information concerning energy efficiency)

Rooms, buildings and neighbourhoods typically do not have user manuals. Those first generation manuals that have been tried and tested in the intelligent building arena do not work well: much information is compiled and seldom referred to. Second generation manuals should be more interactive and informative, giving appropriate guidance and advice on the proper (correct) use of the building/neighbourhood (in terms of heating, lighting, ventilation, waste management). This may require something of a culture change. In the context of energy

data visualization, users should be informed of the benefits of using the manual (and hence the building/neighbourhood) correctly: the cost and carbon implications of real or proposed changes and of particular patterns of use. Visualisation tools need, therefore, to take into account the users' business case for change and/or the users' economic motivation to know/simulate the impact of applying certain strategies.

The utility of printed reports compared to interactive maps is worth consideration. This has been tested in four projects and it is understood that the format is good for those users (such as architects) who require rapid, colour information that is portable and easily shared. This format is also important in instances where audit trails may be required. It is noted, however, that exporting various layers of data can be difficult due to interoperability problems.

8.1.5.3 Knowing what tools users have before creating new ones: providing the tools they really need, can assimilate easily or integrate in their workplace

Requirements capture as a first step before developing software prototypes

It is important to know what users are already employing before trying to create more value with new tools. This ensures that users will interact with the tool and exploit it.

8.1.5.4 Are maps the best way to display information?

Printed reports allow reflection while the screen demands a quick reaction

The utility of a given visualisation strategy depends on use case and purpose of tool.

8.1.5.5 There is no scientific explanation between consumption and demand, the link must be explained through statistics

8.1.6 Thematic Session 3

8.1.6.1 Who is going to buy?

This is a broad question at heart of the issue of this Thematic session. It is initially necessary to ask and answer fundamental questions about the nature of business (e.g., 'what is a business?') and to work to establish clearly who customers are likely to be and what are their actual requirements. This analysis is likely to be quite difficult: new markets are emerging in response to energy policy and, due to the newness of these marketplaces, it is still unclear who the client is, what their needs are, etc.

In answering these questions it is necessary to identify the customer segments of the market and to establish effective strategies for communication with these segments. It is also necessary to gain an understanding of the distribution/logistics of delivering to these markets.

8.1.6.2 How to substantiate the value of a tool?

At the building level there are lots of tools. At the planning level there is more opportunity as there is a lack of tools addressing the needs of planners. Energy managers are well catered for in terms of the tools available to them, though it is possible they have a need for additional visualisation. In principle, end-users of energy services are likely to be un-interested in tools or visualisation, but they are directly affected by decisions made by planners and managers.

8.1.6.3 What are feasible business models?

Business models could be developed around the principles of sustainability, capitalising on social, economic and environmental drivers.

Business model 1 “Mandatory deployment”: Compulsory publication of data from the rest of stakeholders (DSOs, ESCOs, facility management, etc.) in exchange for their access to Open Energy Service Platform (OESP) information.

Business model 2 “Incentives from the municipality”: Stakeholders incentivized (discount in municipal taxes) to publish their data in exchange for their access to OESP.

Business model 3 “Incentives from the rest of end-users”: Stakeholders incentivized from the rest of the stakeholders (reduction electricity bill, electric vehicles information, etc.) to publish their data in exchange for their access to OESP.

8.1.6.4 What is the preparedness to pay?

8.1.6.5 How can volume be built?

Provision of software/service

It is difficult to make a business model with open data. Perhaps the business model lies in the tools, the data manipulation and in how data is displayed to the final user. The availability of data, therefore, leads to tools which lead to sales: this is one model. A variant of this is to obtain data from different parties, do something with it and then sell it. This is difficult, though, as data is power; it is difficult to understand how data owners would participate in such an exchange. However, some agencies, e.g. local authorities and housing groups, are data rich but may be unable to clearly see the value of the data and its manipulation. This may be due to poor internal communications and/or lack of awareness of the external opportunities, as well as to lack of resources within the organisation for the exploitation of the data. The owner of the data may require, or may be led to see the value of, their data being treated in some way: this is potentially a provision of service.

Where the data belongs to the utilities it is likely that they will not be motivated to participate in its provision (as this is potentially contra to their interests) without policy/legislation leading them. There is a need for policy development monitoring and control at a government level in order to drive the market. There are consideration of end-user buy-in here and the need to raise trust among the user/stakeholder communities as end-users of energy services typically have low levels of trust in utility companies. A suggestion to build trust is to utilise community groups and to interact directly with them to demonstrate the potential positive impact on end users.

There is an underlying conflict between using public funding to create value and in the commercial exploitation of this.

Localisation requirements

Data input

8.1.6.6 User/stakeholder/client

Who needs what and who is willing to buy what? For example, planners need tools: see the matrix below, in which the strength of the offering is noted also (that is, the added value of information for the User is that it is made appropriate, both in terms of when they receive it and also its fit with their requirements). The uniting principle, the true added value, in the matrix, is the enhanced, effective communication that the offering brings.

	Policy/urban/building		
	Planning	Management	Users
Tools	✓ Visualisation	✓ Integrate ✓ Exchange (data protection)	
Reports		✓	
Information			✓ Appropriate
	Communication		

A.3 Summary: Overarching Issues

The Workshop discussions converged on several points, open questions and overarching issues; these are summarised in the following bullet points.

- There is a need to share intelligence and encourage collaboration and development in this field. The sharing not just of ontologies, but also of project data in repositories was discussed, and it was felt that this should be achievable, although difficult.
- Is it possible/valuable to compare the activities within projects, at the level of their overview diagrams, in order to generate interaction, commonality and standardisation?
- There is the question of research not going over the same point several times: the “research sector” has a tendency to go over the same ground, develop the same (or similar) prototypes, rather than looking at the real problem (that is, the underlying business, social or environmental problem) and bringing about effective solutions. To address this, the Commission is increasingly bringing Industry into the project space in order to create more acute focus on real problems and the generation of real impact.
- Fundamentally, the community of developers of ICT for energy needs to consider the interface between technology and people: technology provides what people need so there is a strong requirement for technology to be integrated with behaviour.
- There is a strong requirement for the community to stay connected to the realities in the field: why are problems important? This is not a technology question, but is an important question in the development of useful technology.
- It is not energy itself, but energy information that is important thing in the ICT field. However, we don't, as a community, have all the data we need. This problem persists. Also, it is difficult to bring ICT into energy because energy is ‘boring’ in the minds of many end-users.
- The identification of data requirements and the creation of repositories is a theme that cuts across all the projects in this area.

A.4 Conclusions

The participants in the Workshop have identified that they represent a Community of Interest. This community has identified the need to work towards a set of guidelines for the development of tools for ICT for Energy Efficiency that will be suitable for cross-project utilisation. These guidelines should involve the articulation of a minimum-requirements set for prototype tools in this area, and the Community of Interest will work towards the development of the necessary repositories.

There are five key areas with which the Community of Interest is primarily concerned, as identified over the course of the workshop and as reflected in the Matrix 1. These are:

1. Energy (and energy-related) Key Performance Indicators
2. Energy Assessment
3. Development of tools and platforms⁷
4. Strategies for CO₂ reduction
5. Business models.

The Community of Interest has identified that it is unable, in the time available for the Workshop, to codify any guidelines at this stage yet has identified a clear scope for collaboration. To this end, the recommendation of this Workshop is that such collaborative interaction takes place, initially by virtual conference technology in order to more clearly outline the scope of the guidance to be prepared, and then as a Workshop from one of the Community of Interest member projects to develop further these guidelines. This

development is envisaged to take the form, initially, of a matrix of common methodologies and techniques, perhaps with some training for users. This will require the participation of Project Coordinators and the solution to IP issues surrounding access to relevant documentation.