FRONT PAGE

PROJECT FINAL REPORT

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Project acronym: SPORTE^2

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[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

4.1 Final publishable summary report

Executive Summary

Information and communication technologies (ICTs) offer versatile potentials in the building management sector to achieve energy savings and CO_2 reduction targets in Europe. In some areas, like building automation and control, direct impacts of ICT on energy usage can be readily seen.
SportE^2 project, Energy Efficiency for European Sport Facilities, faced the particular world of sport facilities for improving their energy efficiency through an integrated, modular, and scalable ICT system (as combination of hardware and software) capable to monitor, manage and optimize energy consumption as well the energy generate from renewable sources.
The SportE^2 system appears to benefit from a clear competitive advantage compared to other "similar" ICT solutions which do not specifically target sport facilities.
The ICT solutions have been tested and validated in three sport facilities, three pilots, characterised by a mix of indoor and outdoor facilities and different management philosophy:

- the first pilot is in Santa Maria de Lamas (Portugal) and it is provided of two swimming pools and two gyms;
- the second FIDIA, Roma, provided of two swimming pools, one volleyball indoor court, one gym and two outdoor multi-purpose courts. The local generation of energy is provided by gas boilers and a Biomass Plant.
- The third pilot is in Etxebarri (Spain) and is provided of two swimming pools and a multisport indoor court. The local generation of energy is provided by solar photovoltaic and solar thermal panels.

These pilots have been used to identify energy saving scenarios relevant for sport facilities, which could be then replicated in other real environment, and to evaluate the SportE^2 modules in terms of benefits that could be gained by the implementation of the SportE^2 solutions. The pilots have undergone several weeks of pre-control monitoring with the support of energy audits, conducted before any ICT measures, for establishing a reference baseline and then several weeks of monitoring in different seasons with the control and optimisation measures in place.

The validation activities have demonstrated the benefits achievable thanks to the implementation of the SportE^2 system in the three pilots. **In Santa Maria de Lamas**, Portugal, the **energy savings** obtained are respectively of about **30,5% and 42,5% on electrical and thermal energy** (overall savings 36,5%). On the bases of the above energy savings, the **CO_2 reduction** obtained by electricity and thermal saving are respectively of about **30,3% and 69,5%. In Fidia**, Italy, the **energy savings** are of about **24% and 34% on electrical and thermal energy** (overall savings 29%). The energy saving for the swimming pool is of about 31%, therefore SportE^2 achieved the targeted goal.
On the basis of the above energy savings, with reference exclusively the swimming pool subsystem, the **CO_2 emission reduction is of about 29%**, in line with the project targeted goal.
Finally in the Polideportivo Etxebarri the determined **energy savings** obtained during winter and spring seasons are respectively of about **46,7% and 34,3% on electrical and thermal energy** with an overall **CO_2 emission reduction of about 35%**. Furthermore, the **energy savings obtained with the optimized used of solar thermal panels during the summer season are respectively of about**

49% on both gas and thermal energy with an **increased value of about 74% concerning the share of solar energy**. The **CO_2 emission reduction generated by the optimized used of solar thermal panels is of about 49%**.

Such figures demonstrate the project has achieved the original objective of at least a 30% of energy saving and CO_2 emission reduction and are extremely useful as supporting elements to be shown to potential customers interested to our solutions.
Finally, the result of the Marketing Plan and the Financial Plan is very positive and leaves the Consortium optimistic, since SportE^2 appears to benefit from a clear competitive advantage compared to other "similar" ICT solutions which do not specifically target sport facilities.

Project Context and Objectives

Context

The European Sport and Recreation Building Stock accounts for about 1.5 Million buildings in Europe. They represent a significant portion of the overall building stock and consume a disproportionately large amount of energy (6-8%) due to swimming pools, large area HVAC requirements, and indoor/outdoor lighting. Sports facilities are unique:

- in their energy demand profiles (timing and peaks)
- usage patterns (long periods of low use and then short periods of high use sporting event)
- comfort and ventilation requirements
- facility characteristics (e.g. swimming pools, ice rinks, indoor courts, saunas, bar areas, etc.)
- in how they are owned and managed
- they can encompass large open spaces (multiple buildings, complexes, parking areas, outdoor courts and fields, etc.)

Objectives

With this background, SportE^2 has developed an integrated, modular, and scalable ICT system to manage energy consumption, generation. The four scalable and integrated modules based on ICT solutions are:

- **SportE^2 How**: Smart Metering – understanding energy flows.
- **SportE^2 When**: Integrated Control – the ability to actuate and settings
- **SportE^2 Why**: Optimal Decision Making – intelligent and optimal operational strategies
- **SportE^2 Where**: Multi-Facility Management tool – a portal for multi-facility managers

The structure and naming of the four modules builds on people's familiarity with "who, what, when, where, why, and how" to facilitate development, marketing and exploitation. Each module represents a standalone product and service. How they are integrated depends upon the specific needs of the particular facility being considered and the type. Starting from the 3 pilots considered in the project, where the ICT solutions have been deployed and demonstrated, the SportE^2 modules are suitable for various sport facilities types including: Combined Centres (for which FIDIA is taken as benchmark), Olympic pool centres & Gyms (SML as benchmark), Multi Sport Halls and pools (Etxebarri as benchmark), 25 m Swimming Pool Centres, Leisure Pool Centres, Local Dry Sports Centres, and Fitness Centres. These represent a first set of representative scenarios to be considered when offering the SportE2 to potential clients. The project also made use of the KUBIK living laboratory at

Tecnalia where installation and preliminary testing of the SportE^2 modules was carried out ahead of the installation and testing at the three pilots.
The approach and system is appropriate for both new and existing facilities, taking into account that swimming pools and large court areas are in particular large energy consumers.

From this project sport facility owners and managers should expect to answer questions like: How and when am I consuming energy? How do I compare to other facilities? Is anything abnormal? What best practices should I be aware of? If I want to invest in energy efficiency measures, what should I do? What operational strategies can save me energy? How can a centralised and integrated control system improve my facility? How can I start an energy savings program? What indicators should I be using to assess my facility and energy savings program?
Now at the end of the project with the availability of the SportE^2 suite of modules the project partners have the tools to answer the above needs.

Timeline

The project lasted 4 years from September 2010. Initially the intended duration was of three years but the consortium had to face various issues, of technical and coordination nature, which required an extension of the project. With respect to the project timeline, module development and operational optimisation scenarios were developed in the first 2 years of the project, system installation and configuration was basically carried out during the third year, and during the last year the work was centred on the testing of the system at the pilots, and included the pre-monitoring activities and the implementation of the optimisation scenarios and their validation. Also exploitation activities were mainly carried out towards the end of the project.

Work Plan

The work has been divided in 7 main technical work packages where the R&D activities were developed, and one additional work package of management and dissemination.

- WP1 Sport Facilities Energy Assessment & System Architecture: this WP, leaded by D'Appolonia, was focused on requirements and specifications of the SportE^2 system with emphasis on the development, integration and optimization systems, as well as the application in Pilots operating under the control of SportE^2.
- WP2 Smart Metering Network: leaded by UNIVPM, the objective of WP2 was to define, develop and test the SportE^2 How: smart metering module.
- WP3 Integrated Control System: leaded by SE, had the objective to design, develop and test the SportE^2 When: Integrated Control System, providing a core control infrastructure (both hardware and software)
- WP4 Energy Optimization System: leaded by CU, had the objective to realize a real time and highly reliable building Energy Optimization and Controlling System. SportE^2 Why recommends or directly conducts optimized energy saving control measures to account for real time building environmental changes.
- WP5 Integration and Testing: leaded by TECNALIA, has the objective of integrating the modules SportE^2 How, SportE^2 Why, SportE^2 When in order to have a complete ICT energy management system able to drastically reduce energy consumptions and CO2 emissions. Furthermore this WP included the definition and development of the SportE^2 Where: Multi-Facility Energy Indicator System.

- WP6 Pilots Implementation & Validation: the objective of this work package, leaded by DAPP, was to set up three Pilot installations that allows the SportE^2 project to demonstrate and validate system performance for Sport Facilities of different sizes and characteristics located in different climates and European Countries, getting practical experience on the usability of the system in a "real world scenario" that embraces RES, integrated controls and energy management.
- WP7 Market Analysis & Replication Plan: the objective of this work package, leaded by DAPP, was to exploit project results and to support the intended impact of the call and proposal (new ICT market opportunities, collaboration between construction and ICT sectors, radical energy consumption and emission reductions).

Scientific and Technical Results

Sport Facilities Energy Assessment & System Architecture

The first step in the project was the definition of the role and specific weight of sport facilities in the energy efficiency context within construction sector. A first definition of performance indicators, including primary and secondary indicators, of energy audit, regulations, what to be considered as energy savings, a baseline measurement protocol and acknowledgement of comfort was provided. Energy audits were carried out at the three pilot facilities to provide focus and concrete data/examples for the module development. Some important observations were highlighted (see Project Deliverable D1.1 "Performance Criteria and Requirements"):

- The world of sport is an ideal candidate for targeted energy reduction measures. The community is open to such ideas and the facilities that support sport are massive energy consumers.
- Following the trend of the building sector at large, new facilities are not the main challenge. Typically, new facilities are being designed with energy performance as a design parameter. Better envelopes, green design principles, and the use of renewable energy technologies are becoming more common. Instead, it is the retrofit of existing structures that will be the main challenge. Here, optimising the use of the existing energy infrastructure and identifying the highest impact retrofit actions are aspects where focus is needed. However, even for new facilities, building management systems designed for and tuned to the needs of sport facilities are lacking.
- Integrated building management systems adapted for the needs of sport facilities is a high impact market segment in terms of energy savings and business opportunity. Equally important is the placement of such a system into a holistic client-centric approach that adapts to the needs and budget of any particular facility. We have responded to that need through the identification of four scalable modules to be developed in the SportE^{2}project. These will entail smart metering, integrated control, optimal decision making, and multi facility management.

Starting from the above observations, the specifications for the SportE^2 ICT modules were defined, together with the interoperability requirements, communication protocols and communication architecture (see Deliverable D1.2 "System Architecture"). For the SportE^2 ICT system, the basic principles are the following:

- The collected data are normalized and structured;
- The efficient access to data aims to facilitate the identification of the useful information;

- The system makes easy to measure and verify results;
- The system is easy to integrate and interoperate with other ICT systems and provides a platform that embraces industry standards for data collection, management and control, analysis, and publication.

The concept of uses cases and energy saving scenarios are introduced and a first association to the pilot in the project was presented. The SportE^2 system architecture is depicted in picture below.

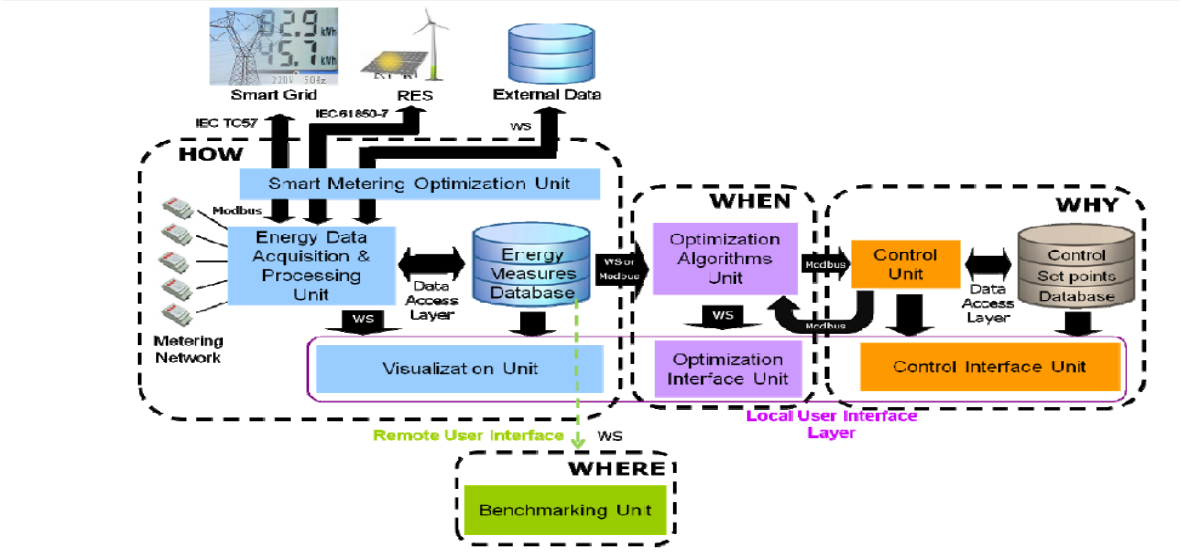


Figure 1: SportE^2 System Architecture

Smart Metering Network (HOW Module)

An original approach has been adopted in SportE^2 to the development of a comfort-based smart metering-system dedicated to sport facilities. In fact, smart metering systems are usually designed only to monitor energy, while comfort is often neglected. This is on the contrary particularly important because of the intense activities carried out, high humidity levels (e.g. in pool areas), the presence of chloride and other chemicals, and the desire to maintain a sense of well-being and comfort. Therefore the environment of Sport Facilities should be managed and controlled not only to save energy and costs, but also to maximize people comfort in all the different functional areas. As a consequence a smart-metering system for Sport Facilities has been here defined and designed in such a way as to be able to monitor energy, comfort, and environmental parameters. Derived benefits are:

- Awareness of how energy is produced and used throughout the building;
- Functional area-based analysis of consumption;
- Direct feedback for control strategies tuning;
- Area's comfort level cognition.

A list of the functionalities provided by the HOW module is provided in the next table.

Table 1: List of macro functionalities provided by the How Module

Module functionalities	Progress Beyond SOA	Scientific Approach

	Module functionalities	Progress Beyond SOA	Scientific Approach
1	Knowledge of real-time energy consumption via sub-metering and proper visualisation/analysis and grid exchange	Integration of multivendor products/systems	Sensors network installation and construction of a baseline for assessment (energy audit used as reference for project assessment)
2	Knowledge of area's comfort condition using PMV	Real time comfort indicators never used in sport facilities	Definition of methodology for PMV measurement in sport facilities
3	Software functionalities with data storage, analysis and dedicated user interfaces	No existing dedicated tool for sport facilities	Dedicated calculation/measurement for data analysis to retrieve operating information (load profiling, anomaly detection, longitudinal benchmark etc.)
4	Optimization of temperature and humidity measurement in large spaces (e.g. swimming pool) and guidelines for energy metering network design	No existing approach in the SOA	Genetic algorithm that find the best sensors number/position using a thermodynamic identification function and laboratory tests for measurements of energy flows
5	Data exchange	Modularity	Integration with the other modules (communication protocols, interfaces, data flow)

The main outcomes and tools from the whole research are:

- A specific approach to design the smart metering system as stand-alone or integrated tool;
- A specific methodology to assess the comfort in sports areas;
- A methodology to process metered data and produce useful information about the use of the energy in sports facilities;
- A powerful graphical tool to calculate and provide previous information to the facility manager/owner;
- An optimization tool to address the specific problem of monitoring the indoor conditions of sports areas.

The HOW Module architecture is presented in Figure 2 below.

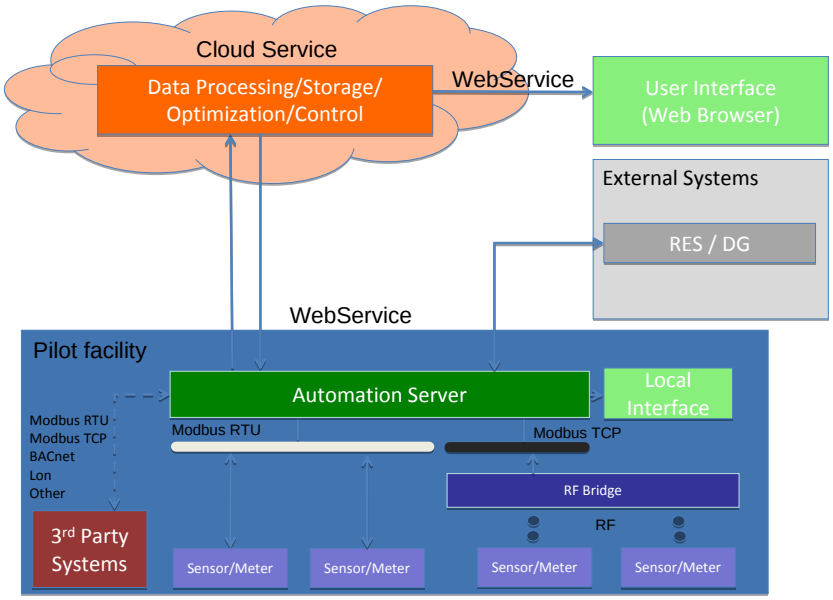


Figure 2: HOW Module Architecture

Integrated Control System (WHEN Module)

With respect to the other modules, SportE^2 WHEN is the action module. When integrated, it receives smart metering data from HOW and optimal set point information from WHY related to energy optimization scenarios that have been developed with dedicated optimization approach.

SportE^2 WHEN module consists of a smart integration of hardware components, communication protocols, software and applications, data models, machine-to-machine, and machine to human interfaces. A Control Unit and its I/O modules, a Control Set-Points Database and an Interface Unit are the main components of the module:

- **Control Unit**: it consists of the Automation Server (AS), it is responsible to manage the set points and variable status of the field controllers used in the facility network. The control can be automatic or supervised by human operators by means of the interface unit installed in the Enterprise server.
- **Control Set points Database**: this module is a relational database where to store set points values of the control devices.
- **Control Interface Unit**: this unit will allow visualizing the status of the set points of each deployed system and remote controller.

Several efforts have been spent in order to define an installation procedure of the SportE^2 When module that will be used in all product delivery to the different sport facilities, as depicted in the next Figure 3. The module offers to end users an object-oriented, graphical operator interface, for handling the day-to-day operation of the installation. The following Figure 4 and Figure 5 show examples of graphics developed as part of the SportE^2 graphics user interface. These basic functional blocks have been realized in order to be easily combined in sequence and implemented at each Sport facility module deployment.

The control strategy implemented in the SportE^2 WHEN module consists of algorithms implemented into the AS in order to control the different plants present in a typical sport facility. The most common control strategies for lighting, heating, cooling and HVAC have been developed and pre-configured according to use cases defined. A set of basic control scenarios and relative control rules

has been defined in agreement with SportE^2 WHY module and control scenarios deployed and demonstrated at the SportE^2 project pilots.

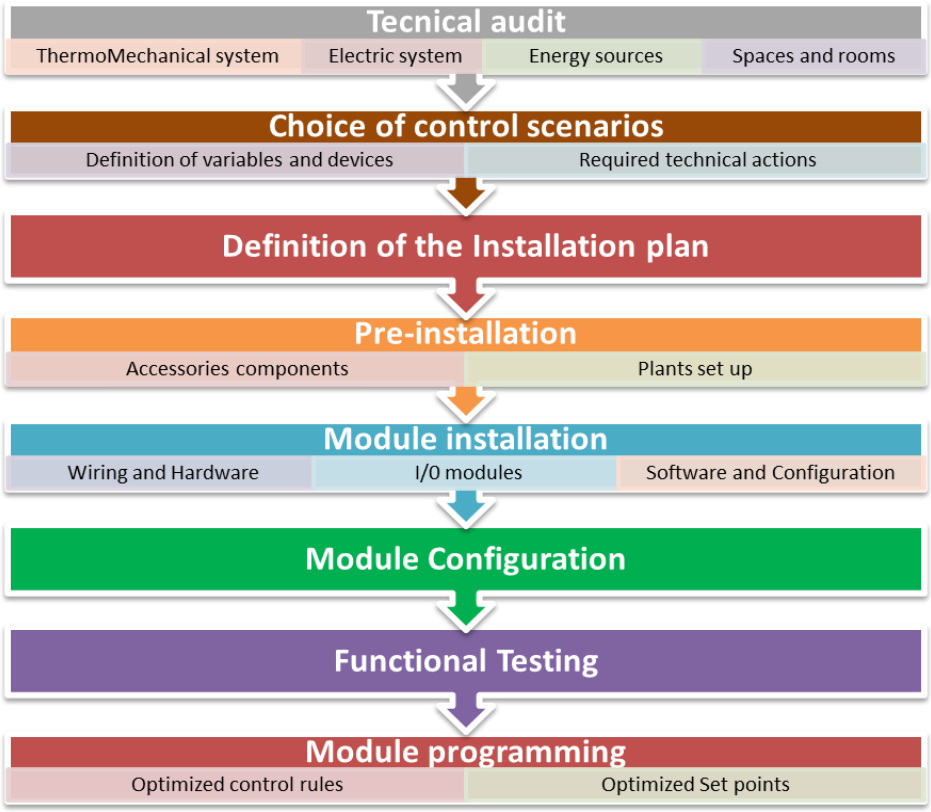


Figure 3: Installation sequence of the WHEN Module.

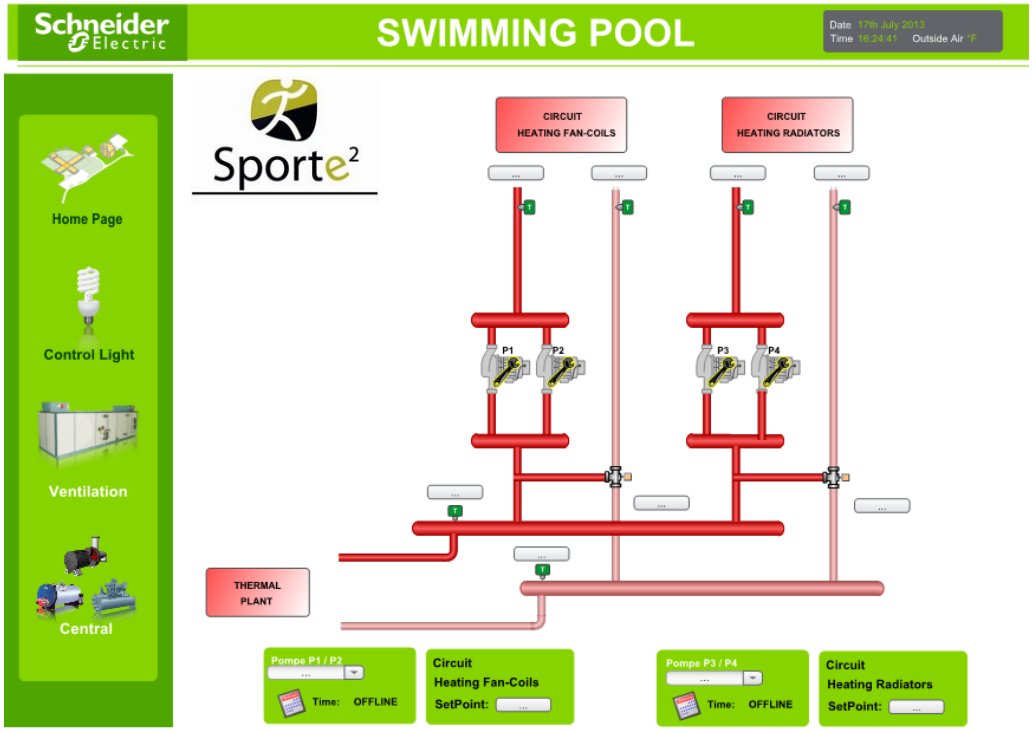


Figure 4: Swimming pool air distribution system graphics.

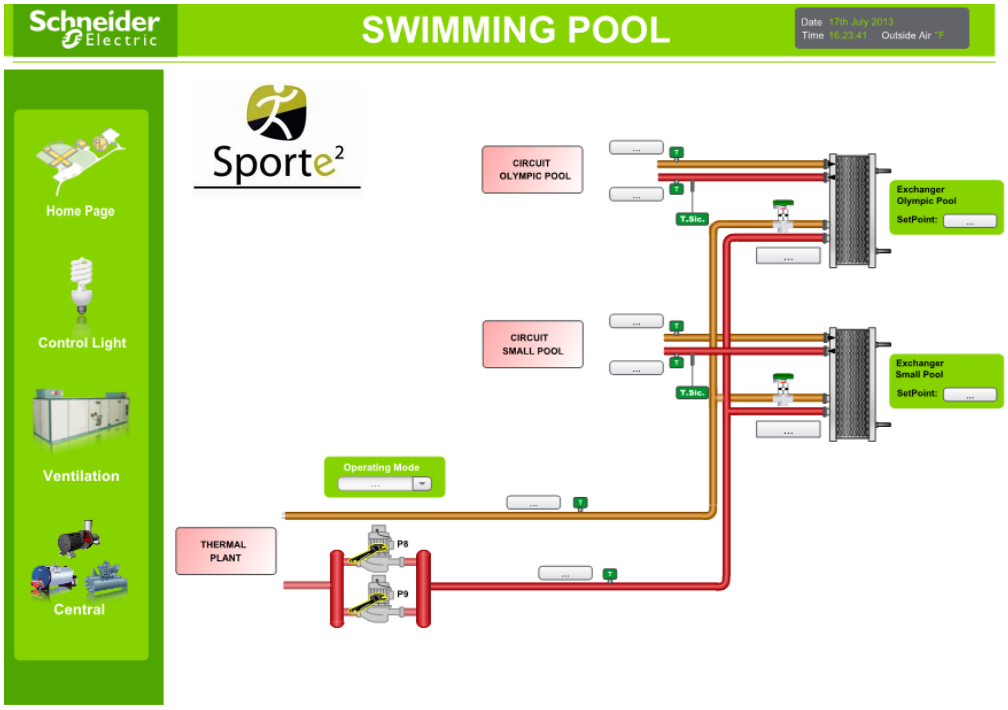


Figure 5: Swimming pool water heat exchanger system graphics.

Energy Optimization System (WHY Module)

The WHY module offers an Energy Optimization Tool able to collect the real-time information from Smart Meters as well external information such as past facility performance, weather data, and facility usage.

SportE^2 WHY devises an innovative approach to realize a near real time and highly reliable building energy optimization system. Provided with high quality monitored data sets from smart metering and distributed sensor network, supported by high power and real time decision making engine and the integrated equipment actuating capability, SportE^2 WHY can at the system and device level recommend optimized energy saving measures to account for real time building environmental changes. The overall optimization engine is based on a large scale parallel/distributed genetic algorithm (GA) framework, and the cost function can be a simulation engine (e.g. EnergyPlus or Simulink) – simulation based optimization; or an ANN executable – ANN prediction based optimization.

SportE^2 WHY module is used to get the optimized set-points in real time. It consists of five components:

1. simulation engine – Simulink or EnergyPlus based;
2. ANN prediction engine;
3. distributed optimization framework;
4. large scale Cloud supporting system;
5. communication among different modules.

Figure 6 shows the entire SportE^2 WHY system architecture, where data are collected from pilot facilities and stored in automation servers, which will then communicate with optimization engine to get optimized set-points in near real time. Optimization engine utilizes Cloud computing module to get the real time result according to the pre-defined optimization scenarios and send it back to onsite

automation server which will then actuate the relevant equipment to achieve the best optimized results.

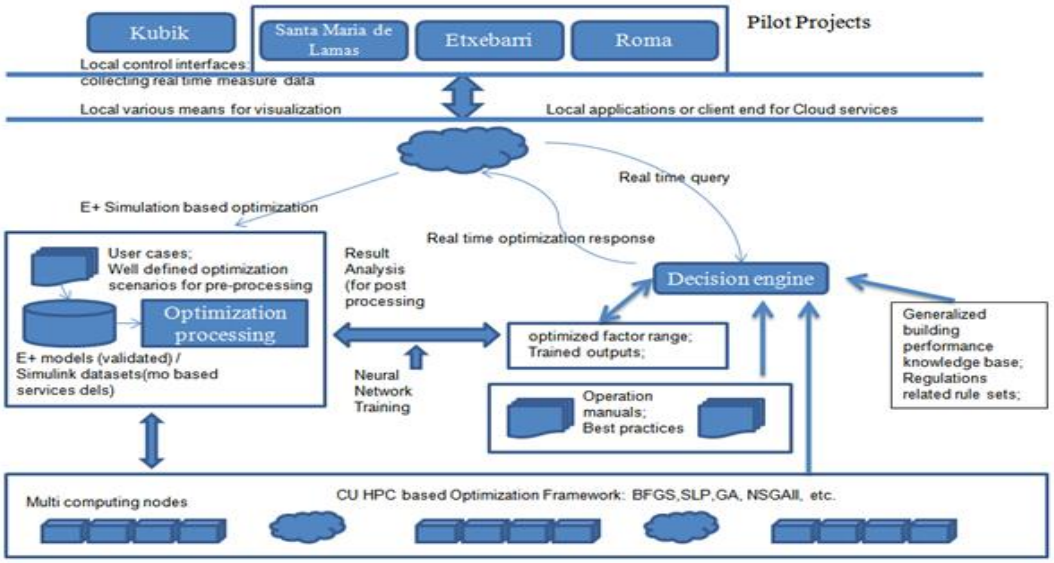


Figure 6: SportE^2 WHY Module System Architecture and Data Flow

Integration and Testing

The SportE^2 integrated architecture, presented in **Error! Reference source not found.**, describes conceptually the link between the different modules that compose the SportE^2 system. In order to guaranty the interoperability and flexibility of the overall system, industry open-standards and widely supported communication protocols have been chosen.

The integration and testing scenarios process definition that includes modules verification and integration was initially performed at Kubik (Spain) test site. Furthermore the integration compatibility tests between WHY module and control and sensor system (HOW and WHEN modules) for pilots scenarios implemented in the SportE^2 project were defined. The general integration deployment process performed ad the Spanish lab was the basis for the deployment process of SportE^2 System in the real pilots.

Finally, the general deployment diagram of the whole SportE^2 solution is illustrated in Figure 7. The SportE^2 WHEN module communicates with the modules HOW, WHY and External web services through Internet connection. The SportE^2 WHERE module and Local Database are currently available within D'Appolonia server farm, but in the future they can be moved on a Cloud system. It can be accessed by using a Web browser connected to the internet.

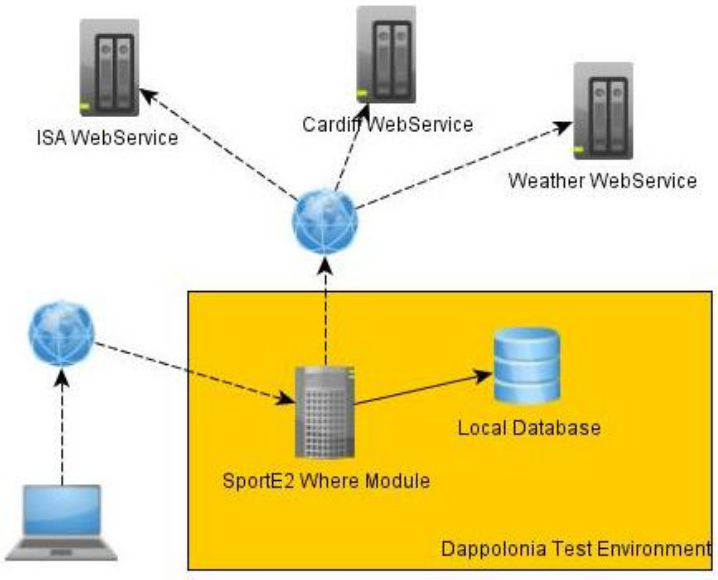


Figure 7: Deployment diagram

The following figures shows some snapshots of the GUI of the HOW, WHEN and WHERE modules, respectively, taken during from the integration and testing activities of the pilots.

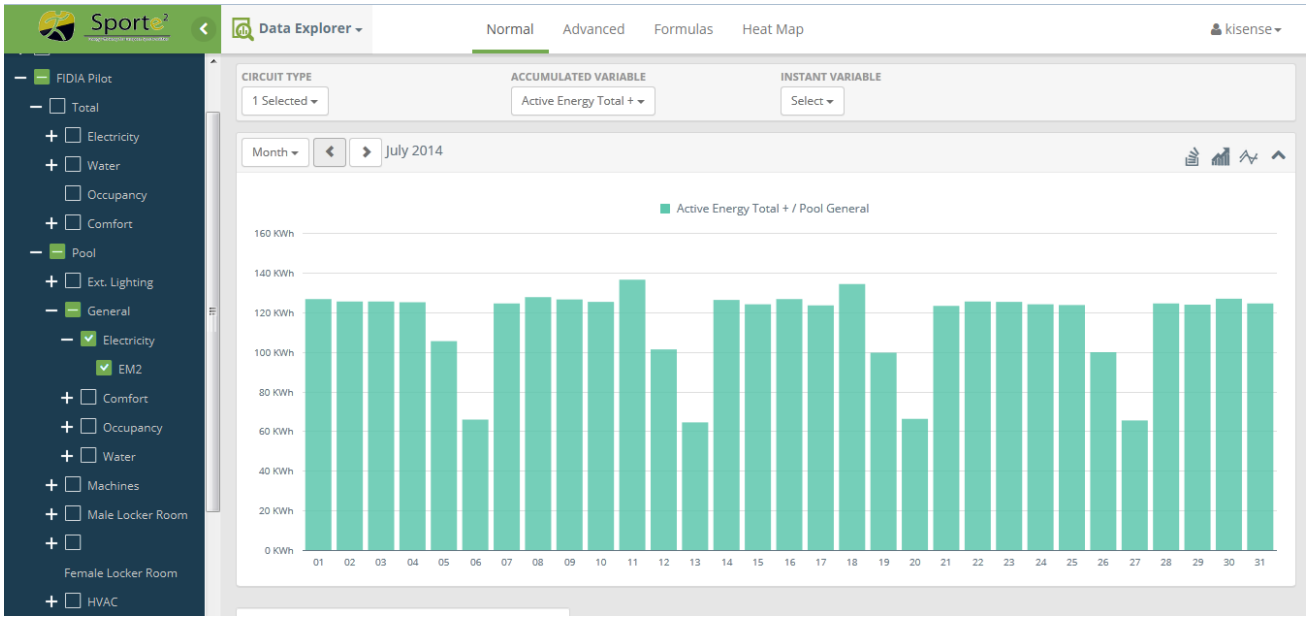


Figure 8: Snapshot of HOW module GUI

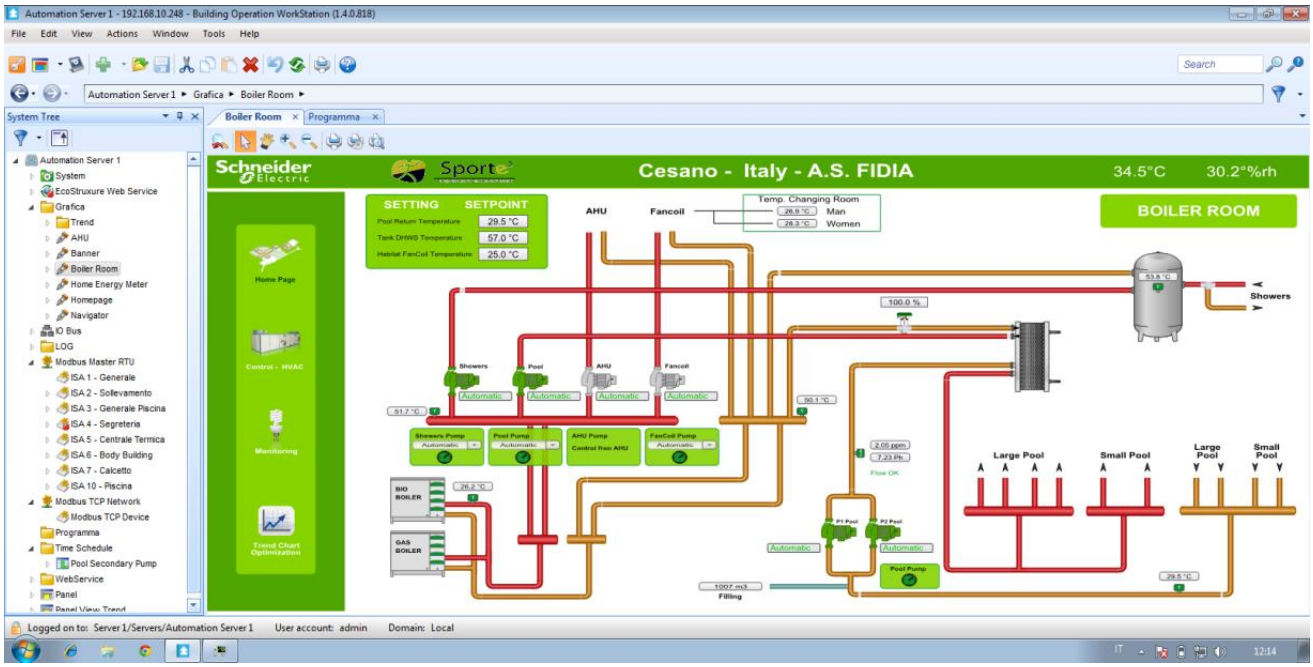


Figure 9: Snapshot of WHEN module GUI

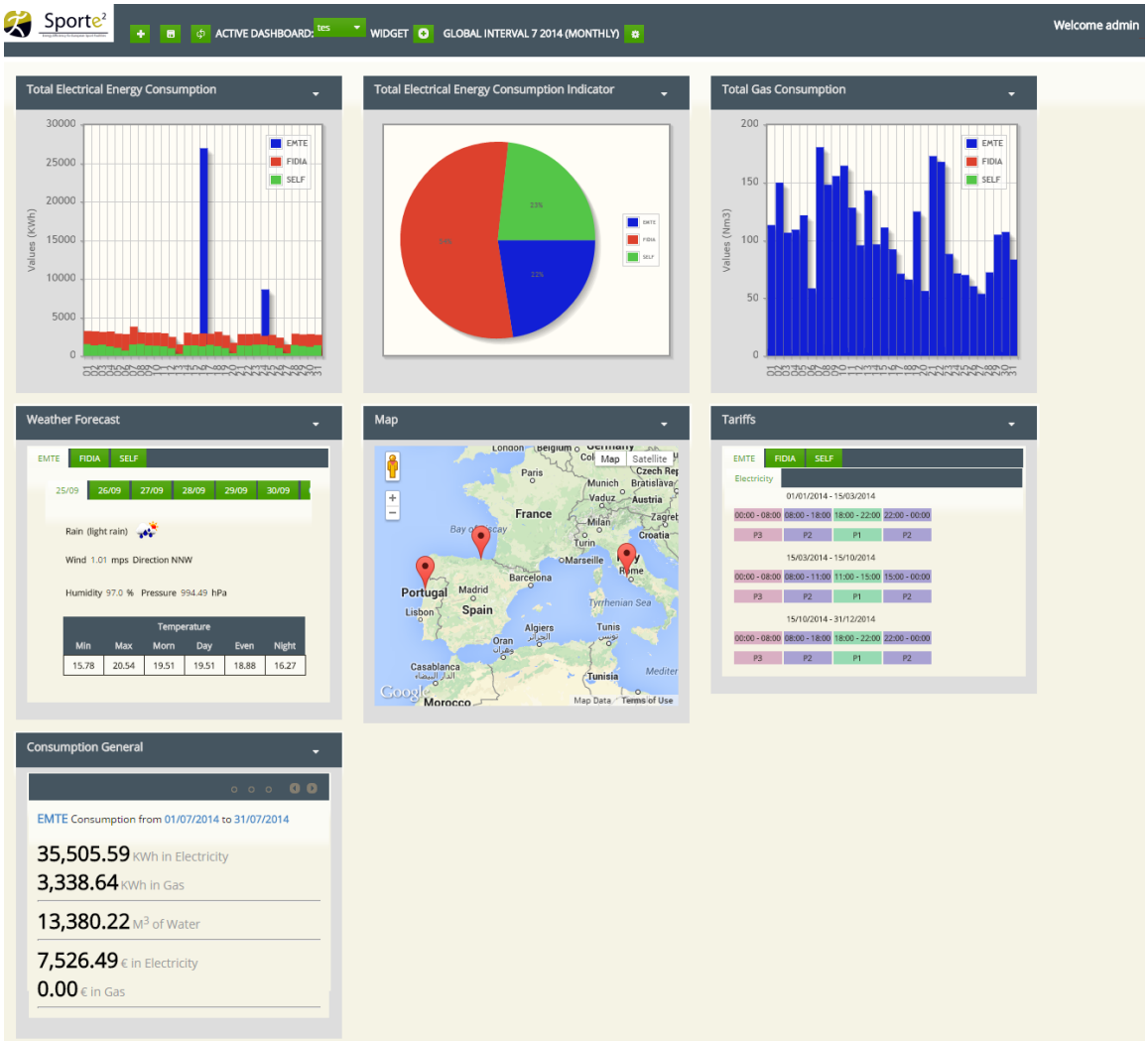


Figure 10: SportE^2 WHERE Module Dashboard Page

Pilots Implementation & Validation

It is fundamental to underline that the three facilities involved in this project were very different in the monitoring and control situation before the project intervention: while FIDIA had no monitoring nor control, EMTE could benefit from an already existing BMS, and finally SML had a half way situation. For this reason, the installation plans have been developed in slightly different ways according to the different characteristics and scenarios of each pilot.

The initial activity was to perform an analysis of the data gathered before the deployment of the modules of the project, in order to provide a clear and specific term of comparison of the facilities performances at a later stage of the project. Figure 11, Figure 12, Figure 13 shows some pictures taken at the different pilots in this phase.

Figure 11: Hydraulic and General Installation at SML

Figure 12: Hydraulic Installation at FIDIA

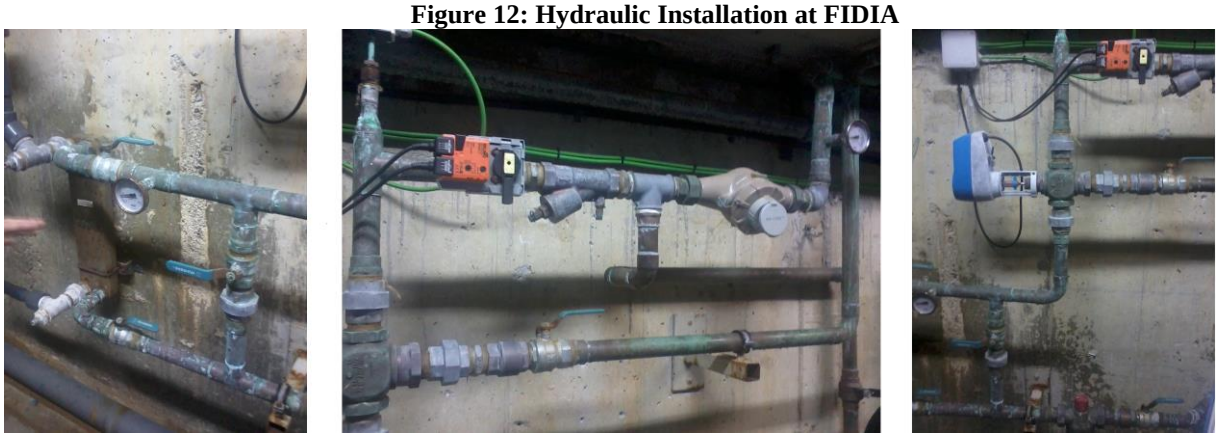


Figure 13: Inspection before the intervention at EMTE

The implementation of the SportE^2 system at the three pilots was carried out following a number of steps which are listed hereafter:

1. Identification of the most energy consumer areas of the facility and definition of the related use case scenario (for instance the air treatment in the swimming pool and swimming pool water pumps in Portugal at Santa Maria de Lamas);
2. Determination of the energy baseline through audit whether available or through the use of experimental data measured by the metering systems;
3. Installation and commissioning of control and actuators;
4. Establishment of the measurement and validation plan;
5. Determination of the energy consumption of three specific reporting periods (winter, spring and summer);
6. Determination of the energy savings;
7. Report of the determined energy savings.

The determined **energy savings** obtained in the Pilot in Portugal at Santa Maria de Lamas with the use of SportE^2 solution are respectively of about **30,5% and 42,5% on electrical and thermal energy**. The overall savings are of about 36,5%, therefore considering exclusively the swimming pool subsystem during the summer time period, the project achieved its targeted goal. On the bases of the above energy savings, the **CO_2 emission reduction** obtained by electricity and thermal saving are respectively of about **30,3% and 69,5%.**

Concerning the Italian pilot, FIDIA in Rome, the determined **energy savings** obtained with the use of SportE^2 solution are respectively of about **24% and 30% on electrical and thermal energy**. With reference to the determined energy saving obtained considering the swimming pool subsystem with the use of SportE^2 solution are respectively of about **33% and 29% on electrical and thermal energy**. The energy saving for the swimming pool is of about 31%, therefore SportE^2 achieved the targeted goal.
Finally, on the basis of the above energy savings, with reference exclusively the swimming pool subsystem, the **CO_2 emission reduction is of about 29%**, in line with the project targeted goal.

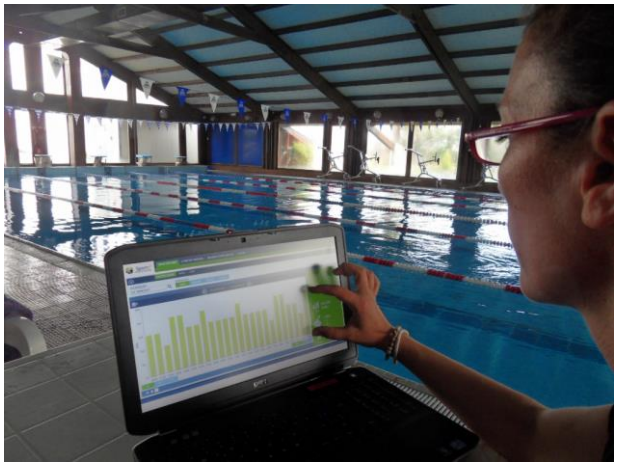


Figure 14: The HOW module tested at FIDIA

Concerning the Pilot in Spain, Polideportivo Etxebarri, the determined **energy savings** obtained during winter and spring seasons for Room#1 with the use of SportE^2 solution are respectively of

about **46,7% and 34,3% on electrical and thermal energy** with an overall **CO_2 emission reduction** of about **35%**.
Furthermore, the **energy savings obtained with the optimized used of solar thermal panels** during summer seasons are respectively of about **49% on both gas and thermal energy** with an increased value of about 74% concerning the share of solar energy. The **CO_2 emission reduction** generated by the optimized used of solar thermal panels is of about **49**%.
It is worth mentioning that the overall methodology and approach turned out to be valuable for the improvement of the facility energy performance. Some specific scenarios or applications were more effective than others and this is due to the fact that the system is in a beta version and the research nature of the project.
However, in any case, each saving was achieved together with significant lessons learnt for the future exploitation of the system and to the benefit of an increased knowledge of the benefits of energy automation in sport facilities.

Exploitation of the project results

Two fundamental aspects were considered for exploiting the project results:

- The SportE^2 suite of tools is composed by 4 main hardware/software modules (HOW, WHEN, WHY and WHERE) which can be combined together in a different way in order to address the need of various categories of customers;
- The roles of the partners in the exploitation of the technical activities related to the exploitation of the results reflect the roles and the type of contributions provided by the partners during the Project development.

Firstly, the combination of the exploitable results leads to the identification of the exploitable solutions that range from the HOW Module as a standalone product, to the combination of all the four modules, HOW, WHEN, WHY, WHERE, as a fully integrated solution.
For each installation of a SportE^2 system in a facility, a baseline has been defined. The baseline is available in three different versions and at three different prices, depending on the size of the facility (and consequently of its energy consumptions).
In addition, to the SportE^2 baseline, six main configurable and customizable packages have also been defined. These packages are finite products that satisfy specific customer needs. Each package is conceived as a solution for energy management optimisation of specific sport facilities areas (e.g. pool, fitness, etc.). All packages have the objective to reduce energy consumption complying with end users comfort needs. For instance, one package, the SportE^2 Pool package, can be installed and customised to those sport facilities with a pool. In this case the package is designed to optimise the management of the pumps of the swimming pools. The optimisation is obtained with respect of quality indoor comfort parameters of the swimming pool (like temperature, relative humidity, CO2 in the air, Cl and pH in the water) perceived by end user.

Secondly, the roles of each partner in the exploitation of the results and the development of the technical activities needed to carry out the commercialisation of the SportE^2 solution have been clearly defined. These roles comprise: the development of energy audits, the architectural evaluation of the sport facility, the detailed design of the SportE^2 configuration most suitable to the type of sport facility considered, the hardware procurement, the on-site deployment of the system software

modules and their configuration, the training of the local people at the sport facility, and the maintenance of the system for the duration of the service.

The business strategy is to provide the most suitable combination of SportE^2 tools depending on the type of customer. To this purpose we have analysed 7 types of sport facilities and for each one of them we have produced a quantitative evaluation of the benefits achieved by the deployment of the SportE2 tools. These customers segments include: Combined Centre (for which FIDIA is taken as benchmark), Olympic pool centre & Gym (SML as benchmark), Multi Sport Hall and pool (Etxebarri as benchmark), 25 m Swimming Pool Centre, Leisure Pool Centre, Local Dry Sports Centre, and Fitness Centre. These represent a first set of possible facility configurations to be considered when offering the SportE^2 to potential clients.

The analysis of the potential customers as well as the solutions available on the market representing potential competitors to SportE^2 is part of the Market Analysis that was conducted during the project duration. Furthermore the Marketing Plan and the Financial Plan highlighted a very positive result and leave the Consortium optimistic, since SportE^2 appears to benefit from a clear competitive advantage compared to other "similar" ICT solutions which do not specifically target sport facilities.

Dissemination

SportE^2 has launched a number of dissemination activities to inform about the project and its results. One of the main dissemination channels is the project website, online at the address www.sporte2.eu, where all the public documents can be found, including the project brochure, the roll-up poster, the press release and the newsletters, periodically updated during the development of the project. A strictly private area of the web portal is reserved to the consortium members where documents, information and any type of materials can be uploaded by the project partners and can be shared across the consortium.

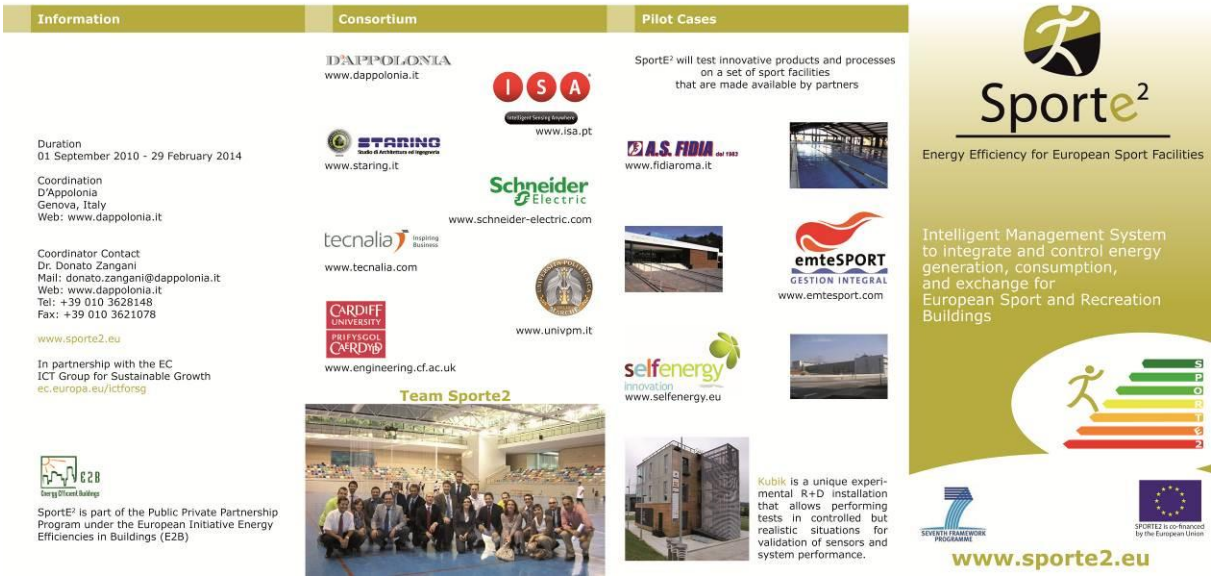


Figure 15: The SportE^2 brochure

Figure 16:The first SportE^2 Newsletter

An Awareness and Dissemination plan was prepared under the coordination of UNIVPM as a basis of a widespread dissemination of the overall picture and the results of SportE^2, also beyond the project's end. The defined dissemination activities are aimed to enhance public awareness and ensure the involvement of targeted stakeholders in order to raise awareness of the work, activities and outcomes of the SportE^{2}project.

Two project videos were also produced in order to make the dissemination of the project towards the general public more effective. The television channel Euronews has been invited to the on-going demonstration trials at FIDIA in Cesano (Rome) and a video has been produced which would give you a flavour of what is going on in the project and the results achieved. The video was aired on the Euronews Channel and is available at the Euronews internet page at the address http://www.euronews.com/2013/04/08/burn-fat-not-energy/

A second video, available at the following URL https://www.youtube.com/watch?v=yqpRYFWVhIk&feature=youtu.be, was designed at the end of the project to approach and inform green building society members, sport facility managers and owners, and other interested stakeholders about SportE^2 system and results related to its application in real sport facility environments.

Figure 17: A frame of the SportE^2 Video by Euronews

In addition to the videos the SportE^2 partners have used a variety of dissemination tools/activities to reach all audiences. These include among others the participation to conferences, events, and workshops and the preparation of published articles and papers. A complete list of such events and paper is reported in Section A1 and Section A2 hereafter.

Furthermore a selection of relevant stakeholders was contacted during the project development including National Olympic Committee, National Sport federations, Sport Facility Manager Associations as well Energy Saving Associations.

Potential Impact

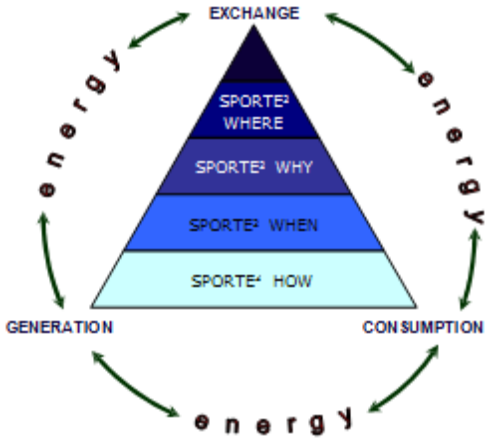
The European Sport and Recreation Building Stock accounts for about 1,5 Million buildings in Europe. They represent about the 8% of the overall building stock while the overall energy consumption is around10% of the building sector.

Sports facilities are unique:

- in their energy demand profiles (timing and peaks) usage patterns (long periods of low use and then short periods of high use sporting event)
- Comfort and ventilation requirements
- Facility characteristics (e.g. swimming pools, indoor courts, saunas, and the like) In how they are owned and managed (public and private)
- They can encompass large open spaces (multiple buildings, complexes, parking areas, lighting, etc.)

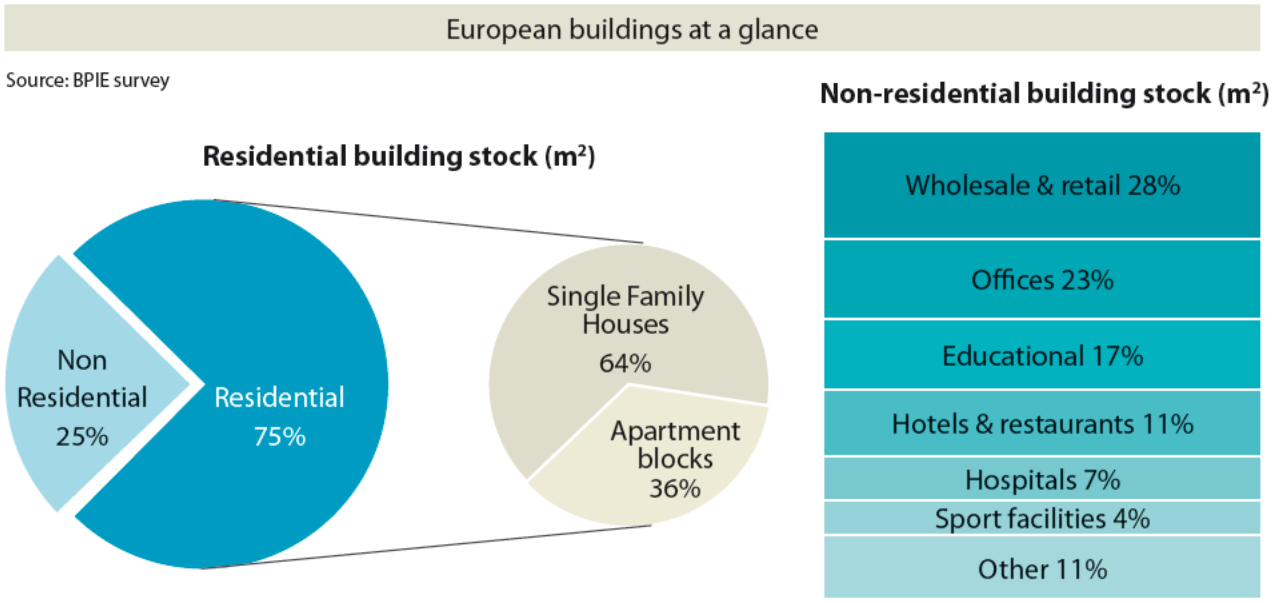
EU dimension of the Sport and Recreation Building Stock.

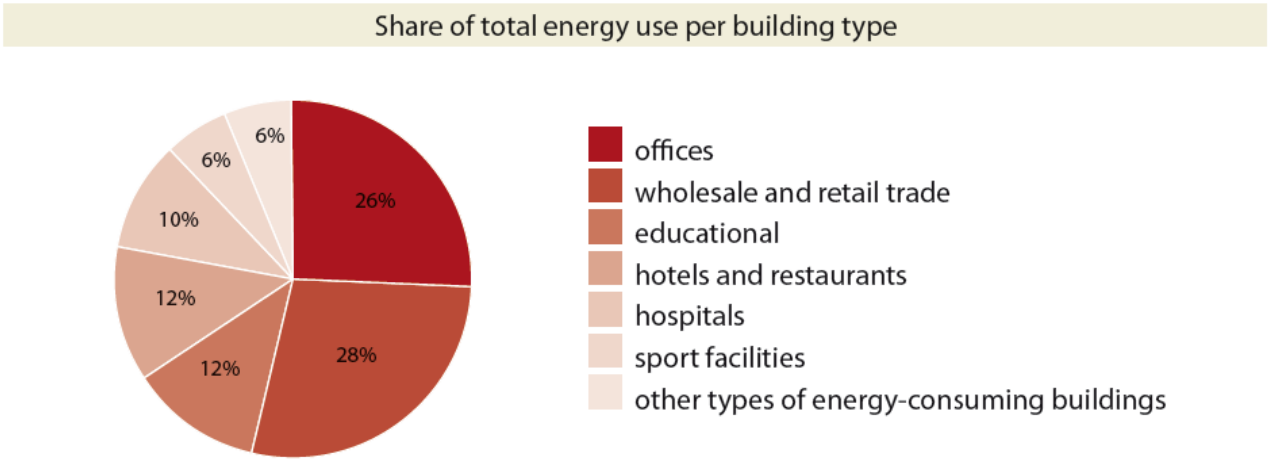
With this background, SportE^2 has developed an integrated, modular, and scalable ICT system to manage energy consumption and generation. Four independent modules are created as shown in Figure below. The structure and naming of the four modules intends to build on people's familiarity with "Who, what, when, where, why, and how" to facilitate development marketing and exploitation. Each module represents a standalone product and service. How they are put together depends upon the specific needs of the particular facility being considered.



SportE^2 Modular Approach.

The project has demonstrated that a 30% energy saving in sport facilities is feasible. Buildings consume about 40% of total final energy requirements in Europe. It is the largest end-use sector, followed by transport (32%), industry (24%) and agriculture (2%). Non-residential buildings account for 25% of the total stock in Europe and comprise a more complex and heterogeneous sector compared to the residential sector. It is estimated that there are 25 billion m^2 of useful floor space in the EU27, Switzerland and Norway. Among buildings, sport facilities represent a significant portion: about 4% of the floor space, corresponding to about 1 billion m^2.
The average specific energy consumption in the non-residential sector is 280kWh/m^2 (covering all end-uses) which is at least 40% greater than the equivalent value for the residential sector. For sport facilities this corresponds to about 280 billion kWh (reference: Europe's buildings under the microscope - A country-by-country review of the energy performance of buildings, published in October 2011 by Buildings Performance Institute Europe, BPIE).





Considering a penetration of 1% of the SportE^2 among European sport facilities in the medium term, we can estimate a yearly energy saving of **8,4 billion kWh**. Since a kilowatt is 1000 watts, running a 100 watt light bulb for 10 hours would equal 1 kWh. Now multiply that by 7 billion and that's the

amount of renewable energy we'll be using on an annual basis by 2020. To help put it into context, here are some examples of what **8,4 billion kWh** can power:

- More than 1,800,000 European average-sized household for a year
- San Siro Stadium in Milano lighting for roughly 1,600,000 evening football games
- The harbour of Genova (the biggest in the Mediterranean) for 168 years
- The equivalent of two coal-fired power plants for more than a year
- The Rockefeller Center Christmas tree for more than 17,743 years
- The entire Disneyland resort for 20 years

Figure 18: SportE2 potential saving comparison

Radical reduction of energy consumption and CO_2 emissions, in line with the policy framework for facilitating the transition to an energy-efficient, low carbon economy though ICT.

EU leaders have committed to transforming Europe into a highly energy-efficient, low carbon economy. The EU has set itself targets for reducing its greenhouse gas emissions progressively up to 2050. Under the Kyoto Protocol, the 15 countries that were EU members before 2004 ('EU-15') committed to reducing their collective emissions to 8% below 1990 levels by the years 2008-2012. The latest emissions monitoring and projections show that the EU-15 is on track to over-achieve this target. Most Member States that have joined the EU since 2004 also have Kyoto reduction targets of 6% or 8% which they are also on course to achieve.

For 2020, the EU has committed to cutting its emissions to 20% below 1990 levels. This commitment is one of the headline targets of the Europe 2020 growth strategy and is being implemented through a package of binding legislation. The EU has offered to increase its emissions reduction to 30% by 2020 if other major emitting countries in the developed and developing worlds commit to undertake their fair share of a global emissions reduction effort (reference: http://ec.europa.eu/clima/policies/brief/eu/index_en.htm).
We know that buildings cause a significant amount of greenhouse gas emissions, mainly CO2, altering our planet's climate. By renovating buildings to high standards of efficiency we can demonstrate that ambitious climate change mitigation actions and improvements in living quality can go hand in hand. This is very important particularly for sport facilities where the objectives of energy efficiency cannot be disjoined with comfort objectives for the users of the sport facility.
In terms of CO_2 emissions, buildings are responsible for around 36% in Europe. The average specific CO_2 emission in Europe is 54 $kgCO_2/m^2$ where the national values of $kgCO_2$ per floor space vary in the range from 5-120 $kgCO_2/m^2$. Considering the above values, sport facilities produce emissions of about 54 billion $kgCO_2$ per year. Considering 30% reduction of emissions thanks to SportE^2, and a penetration of the system of about 1% in the medium term, we can estimate about **0.16 billion $kgCO_2$** which are not emitted into the atmosphere every year.

Establishment of a collaboration framework between the ICT and buildings and construction sectors aimed at exploiting opportunities for the development of ICT-based systems in compliance with the Energy Performance Buildings Directive

Development of information and communication technologies has having a growing impact throughout the entire life cycle of a building, from the design up to demolition and reuse, though service and maintenance. Internet technology in particular has already started to provide a closer link between the participants in the building process, their activity, knowledge, and information.
It is known that when computers were first introduced in the building sector, the initial applications mainly concerned administrative tasks. Gradually their functionality has been extended to support repetitive tasks; nowadays, software applications are becoming essential tools for creative design, for materialization (building technical aspects), and also for the management of the entire building process. SportE^2 is contributing to the establishment of collaboration between the ICT and the building sector, aiming at a better exploitation and management of the sport facilities, which represent an important share of the construction sector, in respect to energy efficiency and quality improvement of the indoor environment.

In short SportE^2 will make an IMPACT:

- By opening a market for **ICT-based customized solutions** integrating products from different vendors and offering services from design of integrated systems to the operation and maintenance phases:
    - Market, Client, and Product Oriented
    - Customised solutions through 4 scalable modules
    - Ability to integrate with existing systems on site
    - Replication Plan Development for EU wide implementation

- Through the establishment of collaboration **framework between the ICT and the construction sectors** aimed at exploiting opportunities for the development of ICT-based systems in compliance with the Energy Performance Buildings Directive:
    - Direct links to E2BA and ECTP platforms
    - Consortium integrates whole value chain
    - ICT-Enabled Energy Audits and Assessments
    - Development of business models and market analysis

- Through the **radical reduction of energy consumption and CO_2 emissions**, in line with the policy framework for facilitating the transition to an energy efficient, low carbon economy though ICT:
    - Up to 30% of Energy Saving
    - Up to 30% Emission reduction
    - Energy Payback period of 5 years
    - Case studies available for bench marking (Italy, Portugal, Spain)

Contact Details

For additional information concerning the SportE^2 project please visit the project website or contact:

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http://www.sporte2.eu/

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- **STARING di Arch. Guglielmetti Maurizio, Arch. Riva Diego e Ing. Marzorati Pier Luigi Associazione -** Pier Luigi Marzorati - marzorati@staring.it
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- **Cardiff University -** HaiJiang Li - lih@cardiff.ac.uk
- **Schneider Electric SPA -** Ivan Mangialenti - ivan.mangialenti@schneider-electric.com

4.2 Use and dissemination of foreground

The business plan for the exploitation of the project foreground has been established and it is detailed in deliverable D7.2 “Business Plan”.

The Dissemination Plan has been prepared and explained within deliverable D8.2 “Dissemination and Awareness Plan”.

Section A (public)

A1: PAPERS AND ARTICLES

Date	Journal/Conference Name	Publication Title	Author(s)	Partner
30.05.2011	Building Simulation 2011 (conference)	Value of building simulation in sport facilities operation	Andrea Costa	DAPP
19.04.2012	IEECB'12 (conference)	Design of a comfort-based monitoring approach for energy efficiency in Sport & Recreational buildings	Gian Marco Revel Marco Arnesano	UNIVPM
01.07.2013	EG ICE 2013 (conference)	A Holistic approach for smart building energy management	HaiJiang Lih	CU
28.04.2014	SDM 2014 - International Conference on Sustainable Design and Manufacturing (Conference)	Parallel computing for supporting complex energy simulation and optimisation	Ioan Petri, Haijiang Li, Yacine Rezgui	CU
05.2014	Enterprise Information Systems (Vol. 0, pp 1-21	A HPC based cloud model for real-time energy optimisation	Ioan Petri, Haijiang Li, Yacine Rezgui, Yang Chunfeng, Baris Yuce, Bejay Jayan	CU
06.2014	Energy and Buildings (Vol. 76, pp 92-101)	High Throughput Computing based Distributed Genetic Algorithm for Building Energy Consumption Optimization	Chunfeng Yang, Haijiang Li, Yacine Rezgui, Ioan Petri, Baris Yuce, Biaosong Chen , Bejay Jayan,	CU
07.2014	Building and Environment (Vol. 88, pp 12-19)	Perception of the thermal environment in sports facilities through subjective approach	Gian Marco Revel, Marco Arnesano	UNIVPM
09.2014	Energy and Buildings (Vol. 80, pp 45-46)	Utilizing artificial neural network to predict energy consumption and thermal comfort level: An indoor swimming pool case study	Baris Yuce, Haijiang Li, Yacine Rezgui, Ioan Petri, Bejay Jayan, Chunfeng Yang	CU
09.2014	Measurement (Vol. 55, pp 382-393)	Measuring overall thermal comfort to balance energy use in sports facilities	Gian Marco Revel, Marco Arnesano	UNIVPM
10.2014	Renewable & Sustainable Energy Reviews (Vol. 38, pp 990-1002)	A modular optimisation model for reducing energy consumption in large scale building facilities	Ioan Petri, Haijiang Li, Yacine Rezgui, Yang Chunfeng, Baris Yuce, Bejay Jayan	CU

Date	Journal/Conference Name	Publication Title	Author(s)	Partner
28-30.10.2014	World Sustainable Building Conference	Baseline Analysis for Deployment of a Scalable and Modular Dedicated BMS in Sport and Recreation Buildings	Jose Maseda, Victor Sanchez	TEC
13.08.2014	Clean Technologies and Environmental Policy (http://dx.doi.org/10.1007/s10098-014-0828-2, pp 1-14)	A semantic service oriented platform for energy efficient buildings	Ioan Petri, Yacine Rezgui, Tom Beach, Haijiang Li, Marco Arnesano, Gian Marco Revel	CU UNIVPM

A2: LIST OF DISSEMINATION ACTIVITIES: INVITED SPEAKING EVENTS

Date	Event Name	Type	Partner
24/25.03.2011 (Oporto, PT)	PPP - Edificios Energeticamente Eficientes	Technical event to disseminate information about FP7 call related with PPP and energy efficient buildings.	SELF
04-05.10.2011 (Warsaw, PL)	ECTP Conference	Conference about construction and societal challenges. The SportE2 project was presented during the conference.	DAPP
24.10.2011 (Nice, FR)	ICT for sustainable homes	Technical event concerning ICT based products and services for the sustainable home where the SportE2 was presented with the speech entitled “From energy audits to ICT implementation: a methodology applied to sport facilities”.	UNIVPM
09-11.11.2012 (Amsterdam, NL)	Metering Billing/CRM Europe 2012, Smart Homes 2012, Transmission & Distribution / Smart Grids Europe 2012	Event for smart utility professionals where the project was presented.	DAPP
01-05.07.2103 (San Sebastian, E)	4th European Conference on Energy Efficiency and Sustainability in Architecture and Planning	Event related to energy efficiency technologies and materials where the SportE2 project has been presented with the contribution “Optimization of Energy Use in Sport and Recreation Buildings”.	TEC
05.2013 (Cardiff, UK)	ICE for Sustainable Places	The contribution “A unified Cloud service for real time optimum building energy management” has submitted and accepted	CU
20.09.2013 (Bolzano, IT)	KLIMA ENERGY 2013	International (mainly from Italy, Austria, Germany) trade show with related workshops and conference about green mobility, energy efficiency, and renewable energy sources. Invitation to present SportE2 project.	SE

Date	Event Name	Type	Partner
03.10.2013 (Milan, IT)	MADE EXPO 2013	International EXPO on designing ideas and building innovation with showcases on building envelope, interiors, energy plants, software and hardware, construction. Invitation to the workshop "SPORT: focus retrofit of the sport facilities" organized by the Olympic National Committee (CONI), EXPO 2015 and Gruppo Sole 24 ORE.	SE
23-24.10.2013 (Madrid, E)	I Congresso Edificios Inteligentes	The contribution “Gestión Integral de la energía en Polideportivos y Hospitales” was presented during the event.	TEC
10.12.2013 (Trento, IT)	WINTER UNIVERSIADE CONFERENCE 2013	International Interdisciplinary Conference on UNIVERSITY Sport: Inspiring Innovation. Organized by the EIT ICT Labs, Business Session focused on innovations in sport and it is tailored for entrepreneurs, start-up, SME and large companies, researchers, sport organizations and government agencies.	SE STAR
21.02.2014 (Bologna, IT)	FORUMSPORT	Forum Piscine is a yearly event that involves experts in the swimming pool sector, though expositions and conferences. Description of the SportE2 project, Main ideas and motivation that generates the project and its objectives, the consortium presentation, description of the 3 pilots involved and the module constituting the SportE2 solution: HOW, WHEN, WHY, WHERE.	DAPP
28.03.2014 (Bilbao, E)	International Conference about technology, Sport and wellness	Conference focused on the presentation of real examples of how sport-related sectors can benefit from the application of new technologies to develop new products and services and future market trends in these areas. The SportE2 project with the application to the Etxebarri sports facility was presented.	EMTE
01-02.04.2014	Impact of the Energy-efficient Buildings PPP	Presentation of the project with the “Energy Management” area	DAPP
01-04.04.2014 (Santander, E)	Congreso Latinoamericano sobre Patología de la Construcción, Tecnología de la Rehabilitación y Gestión del Patrimonio	Information about Sporte2 Project was presented to the audience as part of Tecnalia activities in energy efficiency in construction.	TEC
08.04.2014 (Lisbon, P)	National Communication and Energy Efficiency Seminar; Agência Portuguesa do Ambiente organization	Policies and measures in energy sector: policies and how to make buildings more energy efficient, using new technologies and renewable energy sources. Presentation of the project as case study of energy efficiency technologies	SELF
30.05.2014 (Porto, P)	14th Jornadas de Engenharia – Materiais e energia na engenharia de edificios	Engineering technical conference, materials and energy in building engineering. Presentation of the implementation of energy saving measures with the case study of SPORTE2 project	SELF
07-09.07.2014 (San Sebastian, E)	5th European Conference on Energy Efficiency and sustainability in	Information about the project disseminated within the Conference. Conference organized in collaboration with European Courses by the University of the Basque	TEC

Date	Event Name	Type	Partner
	Architecture and Planning	country. The contribution titled “Optimization of Energy Use in Sport and Recreation Buildings” was presented	
From 26.03.2014 to 12.08.2014 (Porto Area, P)	Technical presentations and meetings with municipalities (Resende, Arouca, Penafiel, Feira Viva)	Technical presentations and meetings with managers and owners of sport facilities; mainly public facilities with swimming pools. Discussion about the possibility of integrating SPORTE2 modules in existing sport facilities and how it is possible to save energy and money	SELF
27.08.2014 (videoconference)	n0e-sport project meeting	The n0e-sport is a FP7 EU project developed under the IEE programme as an integrated initiative on Energy Efficiency and Renewable Energy in Buildings. Presentation of the SportE2 project to include the How, When, Why and Where in the solutions portfolio to be deployed.	UNIVPM

A2: OUTREACH FROM SPORTE2 TO THE PUBLIC AND TARGETED USERS

Date	Target	Type	Results	Partner
17.03.2011	ManagEnergy	Registration		DAPP UNIVPM
07-09.06.2011	Building construction, Real estate	Distribution of illustrative materials (project brochure) during the fair EIRE – Expo Italia Real Estate (Milan, IT)	Collection of contacts of several stakeholders (e.g. StageUp – Sports & Leisure Consortium)	STARING
From 09.2012 to the end of the project	Sports facility users	Exhibition of illustrative materials inside all the pilot cases	Enhanced knowledge and awareness of the project activities	EMTE FIDIA SELF
17-19.10.2012	Building construction sector	Distribution of illustrative material during the fair MADE expo (Milan, IT)	Dissemination of the project activities	STARING
26-28.10.2012	Sports associations, facility managers, sports facilities users	Distribution of illustrative material during the fair Sportdays (Rimini, IT)	Dissemination of the project activities	STARING
27.02-01.03.2013	Architects, sport federations, manufacturers of BMSs, sensors, lighting, other energy intensive building components	Distribution of illustrative material during the fair Serbia Green Building Expo (Belgrade, RS)	Dissemination of the project activities and contact with the President of the Serbian Olympic Committee	STARING
04-06.06.2013	Building construction, Real estate	Distribution of illustrative materials (project brochure) during the fair EIRE – Expo Italia Real Estate (Milan, IT)	Contact with some international companies, among the most interesting one with the Chairman of the Consular Group and the society	STARING

Date	Target	Type	Results	Partner
			Harley & Dikkinson Finance	
07.2013	Sports facilities managers, Sports Associations	The project “totem” was placed near the score board of the International Waterpolo Torunament (Portugalete, E)	Interest from Spanish and Basque swimming federations	EMTE
02.2013 to 07.2013	Sport federations, research, manufactures, building sector, european projects, sport facilities managers, ESCOs, Public administrations	Newsletter #1 distributed to more than 1300 contacts	Feedback and request of further details from most of the contacts	STARING
26.06.2013	Sport associations	Workshop held in the Italian pilot case (FIDIA)	Interest in the SportE2 solution, proposal pf future collaboration for the activities to promote the energy efficiency in sports facility through the associations	ALL
09.2013 to 02.2014	Sport federations, research, manufactures, building sector, European projects, sport facilities managers, ESCOs, Public administrations	Newsletter #2 distributed to more than 1300 contacts	Feedback and request of further details from most of the contacts	STARING
09-11.10.2013	Energy managers, Energy efficiency technologies	Presence with a booth dedicated to Schneider Electric inside the fair “Smart Energy Expo” (Verona, IT)	Dissemination of the project activities	SE
21.11.2013	Building automation, Energy, Facility Manager/Owner	Workshop “Sport facilities: a challenge for energy efficiency” held in the Spanish pilot case (EMTE)	In general participants liked the workshop and sent emails and comments thanking for all. The participants were interested in having specific results. They thought it is a very interesting project.	ALL
27.11.2013	Building construction, retrofitting solutions, building energy efficiency	Oral divulgation of the project activity during the event “RE+ build” (Riva del Garda, IT)	Dissemination of the project activities	SE
18-21.03.2014	Building automation, technicians and system integrators, manufacturers in the thermal comfort field	Distribution of illustrative materials about the sensor optimization unit and the How module during the fair “MCE – Global	Interest from the HVAC control sector and research.	UNIVPM

Date	Target	Type	Results	Partner
		Comfort Technology" (Milan, IT)		
17-19.06.2014	Research, manufactures, building sector, European projects, sport facilities managers, ESCOs, Public administrations	Project Poster exhibited during the ECTP-E2B conference	Interest about the project results	UNIVPM
06.2014	Schneider Electric's Xperience Efficiency 2014. Roadshow in 12 dates over 4 venues (Milano, Treviso, Bologna, Caserta)	Presentation of the SportE2 project during the roadshow and panel about SportE2 in the marketplace	More than 1000 customers attended	SE
25.06.2014	Sport Federations, Public Administrations and Institutions, Consular Facility Managers, Energy Managers, Building construction	Workshop "EXPO: An opportunity for a Smart Olympic Sport – Lo sport efficienta Expo" held in Milan (IT)	Presentation of the project to the Institutions, networking and collection of contacts for the deployment of the SportE2 solution	STARING DAPP UNIVPM
03.07.2014	Building automation, Energy, Facility Manager/Owner, Public Administration, Research	Workshop16 "Advanced Energy Management Solutions for Commercial/Public Buildings" held in Cardiff (UK)	Gold opportunity for knowledge sharing, linking with other project and getting in contact with public administration interested in the energy efficiency technologies in the public buildings. Contact exchanged for future project ideas and collaboration for the deployment of the SPortE2 approach.	ALL
08.2014 to ongoing	Sport federations, research, manufactures, building sector, European projects, sport facilities managers, ESCOs, Public administrations	Newsletter #3 distributed to more than 1300 contacts	Feedback and request of further details from most of the contacts	STARING

Section B (Confidential[3] or public: confidential information to be marked clearly)
Part B1

No applications for patents, trademarks, registered designs, etc. has been presented in the context of the project.

[3] Note to be confused with the "EU CONFIDENTIAL" classification for some security research projects.

Part B2

Type of Exploitable Foreground[4]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application[5]	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
Commercial exploitation of R&D results	SportE^2 Metering System (HOW)	NO		SportE^2 HOW Module	R93.1.1 - Operation of sports facilities	End 2014		UNIVPM (owner)
Commercial exploitation of R&D results	SportE2 integrated control Module	NO		SportE^2 WHEN Module	R93.1.1 - Operation of sports facilities	End 2014		SE (owner)
Commercial exploitation of R&D results	SportE2 real time building Energy Optimization System	NO		SportE^2 WHY Module	R93.1.1 - Operation of sports facilities	End 2014		CU (owner)
Commercial exploitation of R&D results	SportE2 multi-facility benchmarking	NO		SportE^2 WHERE Module	R93.1.1 - Operation of sports facilities	End 2014		DAPP (owner)
Commercial exploitation of R&D results	Integrated Control and Metering System	NO		SportE^2 HOW+WHEN Modules	R93.1.1 - Operation of sports facilities	End 2014		UNIVPM (owner) SE (owner)
Commercial exploitation of R&D results	Integrated Control and Metering System with Energy Optimization tool	NO		SportE^2 HOW+WHEN+ WHY Modules	R93.1.1 - Operation of sports facilities	End 2014		UNIVPM (owner) SE (owner) CU (owner)
Commercial exploitation of R&D results	SportE2 Integrated Solution	NO		SportE^2 suite of tools and related services	R93.1.1 - Operation of sports facilities	End 2014		ALL PARTNERS BASED ON EXPLOITATION AGREEMENT

[19] A drop down list allows choosing the type of foreground: General advancement of knowledge, Commercial exploitation of R&D results, Exploitation of R&D results via standards, exploitation of results through EU policies, exploitation of results through (social) innovation.

[5] A drop down list allows choosing the type sector (NACE nomenclature) : http://ec.europa.eu/competition/mergers/cases/index/nace_all.html

4.3 Report on societal implications

Replies to the following questions will assist the Commission to obtain statistics and indicators on societal and socio-economic issues addressed by projects. The questions are arranged in a number of key themes. As well as producing certain statistics, the replies will also help identify those projects that have shown a real engagement with wider societal issues, and thereby identify interesting approaches to these issues and best practices. The replies for individual projects will not be made public.

A General Information *(completed automatically when **Grant Agreement number** is entered.*	
Grant Agreement Number:	260124
Title of Project:	Intelligent Management System to integrate and control
Name and Title of Coordinator:	Donato Zangani, Dr.

B Ethics	
1. Did your project undergo an Ethics Review (and/or Screening)? • If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports? Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'*	***No***
2. Please indicate whether your project involved any of the following issues (tick box) :	***YES***
RESEARCH ON HUMANS	
• Did the project involve children?	
• Did the project involve patients?	
• Did the project involve persons not able to give consent?	
• Did the project involve adult healthy volunteers?	
• Did the project involve Human genetic material?	
• Did the project involve Human biological samples?	
• Did the project involve Human data collection?	
RESEARCH ON HUMAN EMBRYO/FOETUS	
• Did the project involve Human Embryos?	
• Did the project involve Human Foetal Tissue / Cells?	
• Did the project involve Human Embryonic Stem Cells (hESCs)?	
• Did the project on human Embryonic Stem Cells involve cells in culture?	
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	
PRIVACY	
• Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	
• Did the project involve tracking the location or observation of people?	
RESEARCH ON ANIMALS	
• Did the project involve research on animals?	

• Were those animals transgenic small laboratory animals?	
• Were those animals transgenic farm animals?	
• Were those animals cloned farm animals?	
• Were those animals non-human primates?	
RESEARCH INVOLVING DEVELOPING COUNTRIES	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	
• Was the project of benefit to local community (capacity building, access to healthcare, education etc)?	
DUAL USE	
• Research having direct military use	0 Yes 0 No
• Research having the potential for terrorist abuse	

C Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator	0	4
Work package leaders	0	6
Experienced researchers (i.e. PhD holders)	2	12
PhD Students	0	3
Other	12	34

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	
Of which, indicate the number of men:	

D Gender Aspects

5. Did you carry out specific Gender Equality Actions under the project?

○ Yes
⊙ No

6. Which of the following actions did you carry out and how effective were they?

	Not at all effective				Very effective
❑ Design and implement an equal opportunity policy	○	○	○	○	○
❑ Set targets to achieve a gender balance in the workforce	○	○	○	○	○
❑ Organise conferences and workshops on gender	○	○	○	○	○
❑ Actions to improve work-life balance	○	○	○	○	○

○ Other:

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

○ Yes- please specify

⊙ No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

○ Yes- please specify

⊙ No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

⊙ Yes- please specify: A web site was developed and 2 videos broadcasted targeted to the general public

○ No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

○ Main discipline[6]: Engineering and technology

○ Associated discipline[6]: ICT

○ Associated discipline[6]:

G Engaging with Civil society and policy makers

11a Did your project engage with societal actors beyond the research community? *(if 'No', go to Question 14)*

⊙ Yes
○ No

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

○ No

○ Yes- in determining what research should be performed

○ Yes - in implementing the research

⊙ Yes, in communicating /disseminating / using the results of the project

[6] Insert number from list below (Frascati Manual).

11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?	⦿ ○	Yes No

12. Did you engage with government / public bodies or policy makers (including international organisations)

- ○ No
- ○ Yes- in framing the research agenda
- ○ Yes - in implementing the research agenda
- ⦿ Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

- ○ Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
- ⦿ Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
- ○ No

13b If Yes, in which fields?

Agriculture		Energy	X	Human rights	
Audiovisual and Media		Enlargement		Information Society	
Budget		Enterprise		Institutional affairs	
Competition		Environment		Internal Market	
Consumers		External Relations		Justice, freedom and security	
Culture		External Trade		Public Health	
Customs		Fisheries and Maritime Affairs		Regional Policy	
Development Economic and Monetary Affairs		Food Safety		Research and Innovation	X
		Foreign and Security Policy		Space	
Education, Training, Youth		Fraud		Taxation	
Employment and Social Affairs		Humanitarian aid		Transport	

13c If Yes, at which level?

- ○ Local / regional levels
- ○ National level
- ⊙ European level
- ○ International level

H Use and dissemination

14. How many Articles were published/accepted for publication in peer-reviewed journals?	
To how many of these is open access[7] provided?	
How many of these are published in open access journals?	
How many of these are published in open repositories?	
To how many of these is open access not provided?	
Please check all applicable reasons for not providing open access:	
❑ publisher's licensing agreement would not permit publishing in a repository ❑ no suitable repository available ❑ no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ lack of information on open access ❑ other[8]: ……	

15. How many new patent applications ('priority filings') have been made? *("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).*		
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	
	Registered design	
	Other	
17. How many spin-off companies were created / are planned as a direct result of the project?		
Indicate the approximate number of additional jobs in these companies:		

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

❑	Increase in employment, or	❑	In small & medium-sized enterprises
❑	Safeguard employment, or	❑	In large companies
❑	Decrease in employment,	❑	None of the above / not relevant to the project
❑	Difficult to estimate / not possible to quantify		

[7] Open Access is defined as free of charge access for anyone via Internet.
[8] For instance: classification for security project.

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs:	*Indicate figure:*
Difficult to estimate / not possible to quantify	❑

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

○ Yes ○ No

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

○ Yes ○ No

22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

❑	Press Release	❑	Coverage in specialist press
❑	Media briefing	❑	Coverage in general (non-specialist) press
❑	TV coverage / report	❑	Coverage in national press
❑	Radio coverage / report	❑	Coverage in international press
❑	Brochures /posters / flyers	❑	Website for the general public / internet
❑	DVD /Film /Multimedia	❑	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

❑	Language of the coordinator	❑	English
❑	Other language(s)		

***Question F-10*:** Classification of Scientific Disciplines according to the Frascati Manual 2002 (Proposed Standard Practice for Surveys on Research and Experimental Development, OECD 2002):

FIELDS OF SCIENCE AND TECHNOLOGY

1. NATURAL SCIENCES

1.1 Mathematics and computer sciences [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]

1.2 Physical sciences (astronomy and space sciences, physics and other allied subjects)

1.3 Chemical sciences (chemistry, other allied subjects)

1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)

1.5 Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2 ENGINEERING AND TECHNOLOGY

2.1 Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)

2.2 Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]

2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)

3. MEDICAL SCIENCES

3.1 Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)

3.3 Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

4.1 Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)

4.2 Veterinary medicine

5. SOCIAL SCIENCES

5.1 Psychology

5.2 Economics

5.3 Educational sciences (education and training and other allied subjects)

5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary , methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

6. HUMANITIES

6.1 History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)

6.2 Languages and literature (ancient and modern)

6.3 Other humanities [philosophy (including the history of science and technology) arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S1T activities relating to the subjects in this group]