PROJECT FINAL REPORT

Grant Agreement number:	265177
Project acronym:	BURBA
Project title:	Bottom Up selection, collection and management of URBAn waste
Funding Scheme:	Collaborative Project
Period covered	from 1/01/2011 to 31/12/2013

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1 Final Publishable summary report

1.1 Executive summary

The report provides an overview of the project shortly describing the project and its achievements.
The aim of BURBA (Bottom Up selection, collection and managementof URBAn waste) project was to develop an automatic system to be used for the intelligent waste management. The system consists of Intelligent WAste Containers (IWACs) and an IT tool (Waste Management Platform) for waste collection and transport management, including RFID's (Radio Frequency Identification) ability to reliably identify users and waste categories, cell-phone-based LBS' (location-based service) ability to allow an easy identification of the geographical position of the most suitable waste container and to improve its utilization by the citizen (the closest one to user position, not full, adequate for that waste category, etc). One of the main objects of the project is the electronic system that transforms a waste container into an Intelligent WAste Container (IWAC). It integrates several sensors such as volume, weight, humidity, GPS, 3-axial acceleration sensors allowing context and waste characterization. The container is able to recognize both the user and the waste through the identification with RFID technology and reject not correct disposal (e.g. paper in plastic container). The IWAC have a friendly Human Machine Interface (HMI) that drives the user into the correct disposal process. Finally the IWAC is able to exchange data with the Waste Management Platform (WAMAP) through an internet link. The knowledge base that collects field data is useful to elaborate statistics on user habits, to schedule and optimize the collection process, to optimize the IWAC placement, to search for collection problem or to tax users according to actual disposal and willingness. It is possible to access the database from three different levels:

- User: from a smartphone app (iOS, Android), a Tablet, or simply a pc with internet connection the user can have Access to his data through BURBA portal;
- Operators: they can access data from a smartphone app (iOS, Android) or a Tablet in order to acquire IWACs status and plan/optimize the collection process or the IWACs positioning;

- Municipalities: from a dedicated application or through BURBA portal they can have access to all users data.

Finally the prototypes were tested into the real environment in the municipalities part of the consortium (Santander, Camogli and Rzeszow). The municipalities gave their support during this phase that closed with positive results. The data collected during the on field validation phase were analysed and a statistical elaboration was carried out.
Activities regarding the project dissemination have been done through several channels of communication: articles, meetings, congress and website (www.burbaproject.net).
In order to achieve the expected results of the project, the methodologies were focused on Identification of End-Users (Municipalities and citizens) requirements (questionnaires were prepared in order to collect such requirements), final definition of the main system hardware specifications and selection of the electronic components.
Then also final definition of system software specifications and definition of preliminary design document were finalized. The Consortium has focused also on the system hardware and software development, trying to translate the defined design in real working equipment.

The achievements reached in the project were the following:

- Advanced RFID equipment integrated in the sensing electronics to be positioned inside intelligent waste containers (IWACs) for urban and industrial use (600 litres and more), not only for container identification but also for user and waste classification;
- LBS (Location Based Service) citizen-centred for waste management segregation and disposal, system that enables the citizen to know through the cell-phone where, when and what waste can be disposed of, how much will it be charged, how much is recycled, how much the citizen attitude contributes to CO2 reduction, which rewards she/he will receive;
- LBS application and technology used for positioning both in urban areas;
- Technological developments for the power source for the intelligent container electronics pack;
- Citizen's Waste management IT tool innovation exploiting accurate position (in real-time LBS) and RFID to improve service (sorting, billing, educational and motivational feedback);
- Waste service management IT tools innovation exploiting accurate position in real-time and RFID to improve service;
- Intelligent Waste Containers (IWACs) design and prototypes.

The aspects that have been analysed during the project and should require an improvement in future are related to the following issues:

- The refitting of a standard waste container do not guarantee a satisfactory reliability. To extend the usage of the IWAC on a large scale application the design of a new container mold should be one of the necessary element;
- As a result coming from pilot implementation and trials, the weighting system should be improved. The measures obtained were not as reliable as expected due to container characteristics and to the solution applied on the IWACs prototypes;
- The usage of RFID tags technology is currently not applied on a large scale to mark products and packages. This lack from the market limits the usage of the “bulk” waste that in this project has been overtaken by the use of tagged bag in order to be identified by the IWAC (tagged bag has been provided to citizens for validation purposes, see WP 6);

- During the project there was not any element to submit a Patent. The consortium identified the whole BURBA system as patentable once designed for a large scale application after an industrialization process.

1.2 Summary description of the project context and objectives

Waste management is an urgent problem in urban environments. A more efficient and sustainable waste management system could promote higher life quality and fewer costs for the city authorities and less impact on the environment. The overall goal of urban solid waste management is to collect, treat and dispose of solid wastes generated by all urban population groups in an environmentally and socially satisfactory manner using the most economical means available. As cities grow economically, business activity and consumption patterns drive up solid waste quantities which should be recycled in order to foster environmental sustainability of the process. At the same time, increased traffic congestion adversely affects the recollection process by the waste fleet, which should be carefully planned and optimized in order to reduce the environmental impact.
The context in which project BURBA arose covers all main environmental aspects that are daily faced by each European municipality. The solution of having an optimized scheduling of the waste collections in an urban area may lead to many environmental and societal advantages for municipalities and its citizens (reduced truck traffic for collection and recycling, reward taxation system for "good" citizens, etc).
The aim of BURBA project is the development of an automatic system to be used for intelligent waste management. The system consists of intelligent waste containers virtually linked thanks to an IT tool for waste collection and transport management. Each container includes both high-tech sensing components for detection of useful parameters, and high-tech functionalities such as RFID's (Radio Frequency Identification) and cell-based-phone LBS' (Local-Based service) abilities. RFID allows to reliably identifying individual receptacles, users, single marked items or waste categories, while LBS allows an easy identification of the location of the most suitable waste container and an improvement of its utilization by the citizen (it permits to choose the closest one to user actual position, not full, for that waste category, etc).
Three different municipalities are involved in the project, Camogli (Italy), Santander (Spain) and Rzeszow (Poland), in order to give an European dimension to it, being able to include requirements coming out from quite different urban realities.

1.3 Description of main S &T results/foregrounds

First of all, before introducing the results of the project, it is important to define the background at the beginning of the project. The state of art against the solution proposed in the BURBA project was the following:

- Intelligent containers: many systems have been developed, none includes receivers integrated inside the waste container for wireless transmission of data, accurate positioning, RFID reader of waste, user identification;
- Waste management optimization: no system contains up-to-date information about accurate position generated by the container itself;
- Software for waste management: no real time system exists that correlates accurate position of containers and kind of waste;
- Citizen centred LBS for waste disposal: no such a system currently exists;
- Feedback information to individual user: no such a system exists;

- Feedback and statistics for producers and sellers of goods RFID marked, undergoing regulatory constraints: no such a system exists;
- System supporting Rewarding policy for intelligent waste disposing citizen based on actual individual data: no such a system exists;
- Existing sensors solution previously developed and tested by POLIMI in the frame of the Cleanwings Project (Intelligent supervision for Big Area waste disposal system, project number: C/II/S/07/025, http://robotica.mecc.polimi.it/cleanwings/index_en.php).

The main activities carried out in BURBA project are here presented considering each technical work package. The WP 1 and WP 7 concerned the horizontal activities (the first one of management and the second one of dissemination).

The first achievements were carried out during WP2. This focused mainly on user requirements identification, definition of technical specification, implementation of preliminary design of the system (see Figure 1) and, finally, evaluation and scientific assessment.
In particular, WP was split in the following tasks:

- Task 2.1 (Leader: Kontor 46) related to user requirements definition (including a preliminary commercial feasibility study of the system);
- Task 2.2 (Leader: Acorde) related to technical specifications;
- Task 2.3 (Leader: Kontor 46) related to the definition of a preliminary design document;
- Task 2.4 (Leader: Polimi) related to evaluation and scientific assessment.

The task 2.1 was dedicated to the definition of a number of scenarios and target applications. At the project beginning Ridgeback (substituted by Kontor 46 after the project amendment dated 1st January 2013) wrote a questionnaire to be addressed to Municipalities and sent to end-users for collecting their opinions about: their habits and expectation from a new intelligent waste management.
The questionnaire was the starting point in order to collect Municipalities and citizen needs and understand which functionalities have to be integrated in BURBA system. The details on the questionnaire structure and results are presented in project Deliverable D2.1.

The foreseen preliminary commercial feasibility study of the system was not performed because the system maturity was not advanced enough to consider all the necessary steps for an industrialization stage. The prototypes were not designed in order to be a final installation, in fact, as an example, the system was not certified (e.g. shocks and vibrations). These would be necessary for performing the operations of emptying/ transportation and replacement of waste containers. Anyway this study was then faced in WP7 (task 7.2 "Business model and way to market"), that lasted till the end of the project.

The task 2.2 was focused on the translation of the technical requirements, as defined according to end users needs, into both hardware and software specifications. The main technical results of this task have been the translation of the collected requirements (both coming from the questionnaires results and from the technical experience of BURBA partners) towards the definition of high level technical specifications both at HW (ACORDE) and SW (Tekever) level. The HW have been designed in order to guarantee a good duration without maintenance paying attention in power saving, and the SW has been realized to have an easy of use interface and to be flexible and multi-language. For communication among the BURBA systems (IWAC-IRN-WAMAP) a dedicated protocol (communication middleware technology) was defined.

A complete description of the work done is available in Deliverable D2.2 (HW) and in the Deliverable D2.3 (SW).

The task 2.3 was focused on the preliminary design specification. The reached goal was to define a complete high-level end-to-end application and architecture through a preliminary design document based on results obtained in Task 2.2. In this first design documents each subsystem has been defined:

- IWAC: it contains the electronic elements necessary to efficiently implement the functionalities requested to the waste container;
- IRN (IWAC Relay Node): it allows each IWAC to connect to the Central Office implementing a bridge between public network and internal network;
- Municipality Control Centre: it provides and collect data from BURBA elements and users;
- Trucks: they have access to data and they can interact with the Control Center;
- Citizens: they can have access to the system from mobile smartphone or from the PC in order to access historical data or to be aware of BURBA system status. in order to interact with BURBA system;

Figure 1 shows the architecture of BURBA system preliminary design. Further details are contained in Deliverable D2.4.

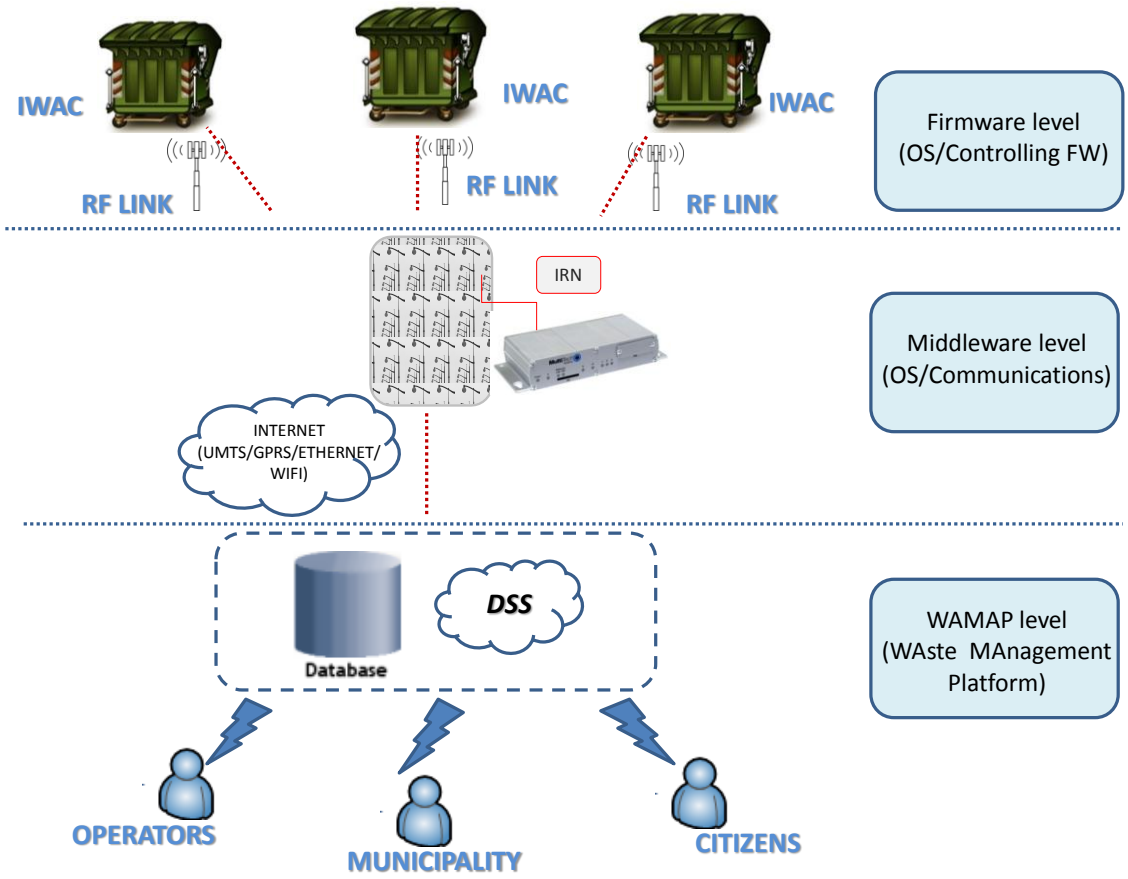


Figure 1: General Architecture of BURBA system

The evaluation and scientific assessment, whose leader was Polimi, was fulfilled by task 2.4 (“Evaluation and scientific assessment”).

This evaluation of the scientific assessment consisted in:

- Evaluation of scientific assessment;
- Life Cycle Assessment studies;
- Environment policy briefs.

BURBA's research project has highlighted some positive fundamental factors:

- The collection of waste is an economic process that can be profitable because the recycling of the material, otherwise lost, adds value to the recovered object.
- The collection of waste is a factor of civilization and improvement of the quality of life.
- The intelligent waste collection, carried out with modern means of technology and research, is a trampoline for a new life on environment.

According to the analysis of these factors, Polimi reported the activities carried out for the system evaluation, in the Deliverable D2.5.
Regarding the Life Cycle Assessment (LCA), Polimi started from their preliminary study and extended the analysis. This LCA on BURBA system was performed in accordance with ILCD Handbook document (International Reference Life Cycle Data System).
The fundamental steps performed were the following:

- Defining the objective and the application field of study;
- Compiling the inventory of inputs and outputs of the system;
- Evaluating the potential environmental impacts related to inputs and outputs;
- To interpret the results on the basis of the LCA objectives steps.

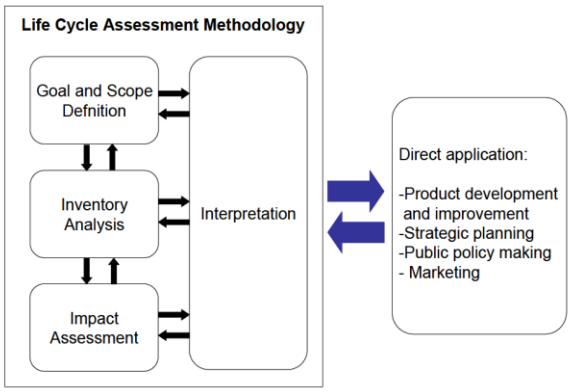


Figure 2: Methodology of LCA

With these inputs and following the methodology visible in Figure 2 the Life Cycle Impact Assessment was performed.
As expected, the main environmental impacts are related to the frame of container. The production process requires the realization of a polymer that is high energy consuming activity at mould level and it presents significant impacts on end of life disposal (as also described in Deliverable D2.6).
Finally, the last topic of WP2 in task 2.4 is related to environment policy briefs. Kontor 46, in charge of this activity, analysed the possible contributions of BURBA project to the European Environmental Policy and Laws and as input to the Newsletter of the EU Commission Environmental Policy Briefs.
The newsletter editor from The EU Commission Environment Policy Brief has been contacted by the BURBA project, but till up to the end of the project he did not appear to be interested in publishing information related of the BURBA project. The procedures followed for these activities were reported in Deliverable D2.7.

The WP3 was devoted to the design, integration and testing of the electronic equipment to be installed in field (related to waste container), starting from COTS components for standard purposes (mainly the IWAC and IRN).
In particular, WP was split in the following tasks:

- Task 3.1 (Leader: Acorde) related to electronics components design;
- Task 3.2 (Leader: Acorde) related to hardware integration;
- Task 3.3 (Leader: Polimi) related to hardware test.

The goal of task 3.1 was to select and design electronic components that satisfy HW technical specifications defined in task 2.2 and task 2.3. This selection had to meet the design and development for the basic blocks like sensor network, localization device, wireless infrastructure and power module to be integrated in the HW platform.
ACORDE searched and selected all those components necessary to implement different functionalities like RFID recognition, container location, volume detection, weight measurement, temperature, humidity and movement. It chose different elements to build the locking system and the HMI to inform the user about the status of the container and the result of the operation (LEDs and external buttons).

The objective of task 3.2 was achieved by the integration of the modules designed in task 3.1 into working platform. Basically the integration dealt with the IWAC and the IRN.
The integration relative to the IWAC involved the following components:

- Locking system to allow the automatic opening and closure of the lid;
- Load cells to be Integrated in two diagonal wheels;
- Solar panel predisposition to harvest energy from the environment;
- Electronic cabinet that include the assembly of the main electronics (Figure 3).

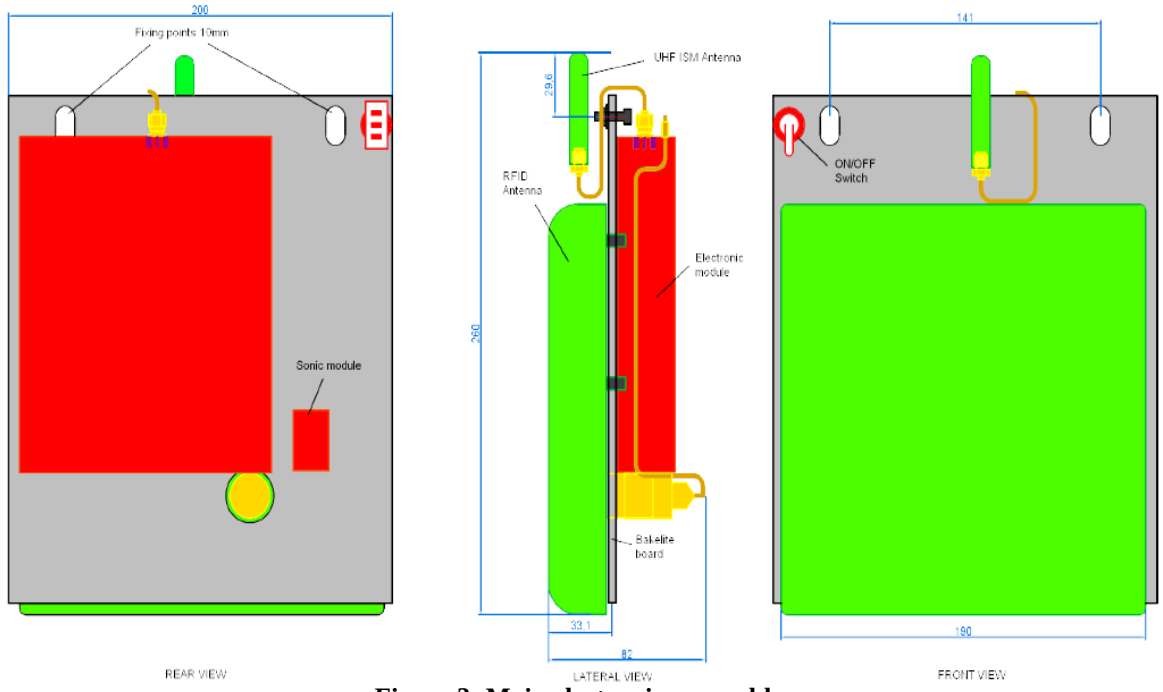


Figure 3: Main electronics assembly

The required functionalities were successfully translated into a first standard container used in Santander city and a first prototype of IRN has been realized. The Deliverables D3.1 and D3.2 describe the activities performed in details.

Polimi, together with ACORDE and D'Appolonia, performed HW tests on the electronic hardware developed in task 3.2.
The testing activities (task 3.3) were organized (test plan definition) according to a testing procedure that was prepared to define a set of tests covering the whole system functionalities.
During the tests, performed in ACORDE premises, a test report document reporting all the obtained results was signed by all partners (Test Data Report - TDR).

The tests had positive outcomes and the complete successful results of the task are included into Deliverable D3.3.

The WP 4 was dedicated to the implementation of the software for the DSS (Decision Support System) composed of: software routines on board of the built-in devices (kernels, firmware), the implementation of coding standards for the data framework compatibility and the interface with external systems, as well as the software for the Waste Management Platform (tool for the Citizen, tool for the Waste Management Companies).
In particular, WP was split in the following tasks:

- Task 4.1 (Leader: Polimi) related to sensors and positioning modules;
- Task 4.2 (Leader: Tekever) related to users interfaces and applications;
- Task 4.3 (Leader: Tekever) related to communications.

In the task 4.1 POLIMI, taking advantage of its expertise about sensors development, provided support for the SW implementation dedicated to sensor and positioning data as reported in detail in deliverable D4.1. POLIMI gave indication for acquisition of sensors and positioning data focusing on the following aspects:

- Collection;
- Process;
- Clustering.

The tasks 4.2 focused on the development of the DSS that is composed by all software interfaces to the external systems, users application (HMIs), municipality application, operators application and central database.
To provide an overview of architecture complexity the different interfaces that were successfully integrated in the system are the following:

- Interfaces of the sensor and positioning modules;
- Interfaces that allow the users to control and interact with BURBA;
- Interfaces of existing systems already employed by waste management companies;
- Interfaces to back-office systems: fleet management solutions, workforce planning, network operators, mapping systems and others identified in WP2 and implemented in this task;
- Interfaces to maps and GIS systems, system control functions, statistics modules and preliminary billing modules for testing the incentives functionalities.

The details of the activity carried out are described in Deliverable D4.2.

The task 4.3 concerned the communications middleware developed by Tekever. This software module was fundamental for data exchange from the IWAC to the BURBA system and viceversa.

The focus was also on how to deploy the communication middleware technologies (HW and SW Specifications defined during WP2) in the BURBA project to handle the waste containers sensors data communications.
The physical element that provides the connectivity to IWACs is the IRN. The IRN is equipped with communication interfaces and has been ad hoc programmed to implement the BURBA DSS functionalities.
The major success of this task was to adapt standard COTS equipment integrated with custom elements such as antennas and RF module (designed and realized by ACORDE), and creating an easy to install system (Figure 4).

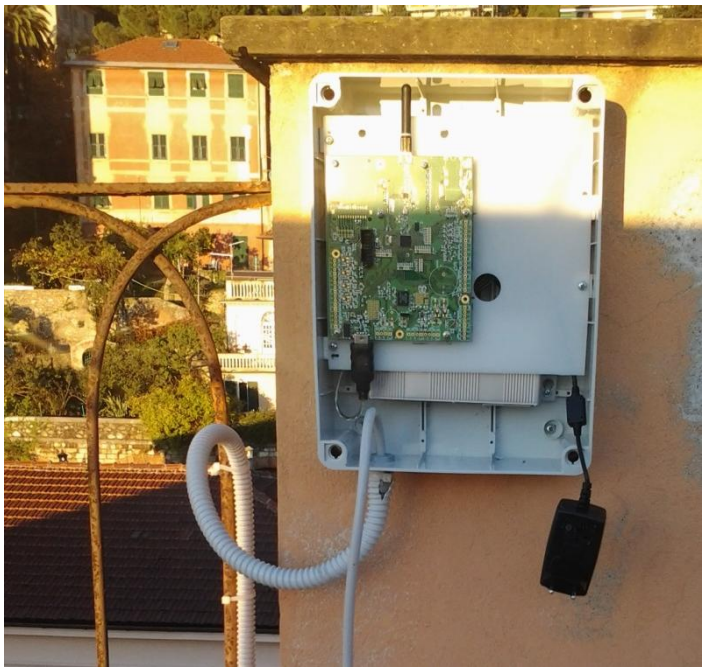


Figure 4: Example of IRN installation

Tekever took care of creating specific services to remotely interact with IRN platform. The Deliverable D4.3 provides all the details regarding the development performed for this task.

Concerning the system integration, its aim was the integration of hardware and software within the prototype implementation of the intelligent waste container and the integration of the replicas to be deployed in the further BURBA validation phase.
The WP5 was organized into four tasks:

- Task 5.1 (Leader: D'Appolonia) related to HW/SW Integration;
- Task 5.2 (Leader: Polimi) related to testing;
- Task 5.3 (Leader: Acorde) related to Intelligent Waste Container Integration;
- Task 5.4 (Leader: D'Appolonia) related to pilot implementation.

The Task 5.1 goals were to prepare and perform the physical integration of the system and also to carry out the integration of HW and SW modules developed in WP3 and WP4. These objectives could be reached in parallel. As task leader, D'Appolonia dealt with a preliminary analysis of physical integration and coordinated the integration of HW and SW modules. Therefore, as far as the HW and SW integration is concerned, D'Appolonia strongly collaborated with Acorde and Tekever.

The integration scheduling and activity started at the beginning of M25. Before this step Acorde had developed the first version of the software library in previous tasks that allowed the remote monitoring and control from the integrated WAMAP platform. Once Tekever finished the integration of the library, the HW/SW integration test procedure started. During the integration process, several library versions were released.
The communication protocol was defined by ACORDE to provide access to all functionalities that offer both the IRN and the IWAC prototypes parts (Figure 5). The results and reporting of this integration phase is described in D5.1.

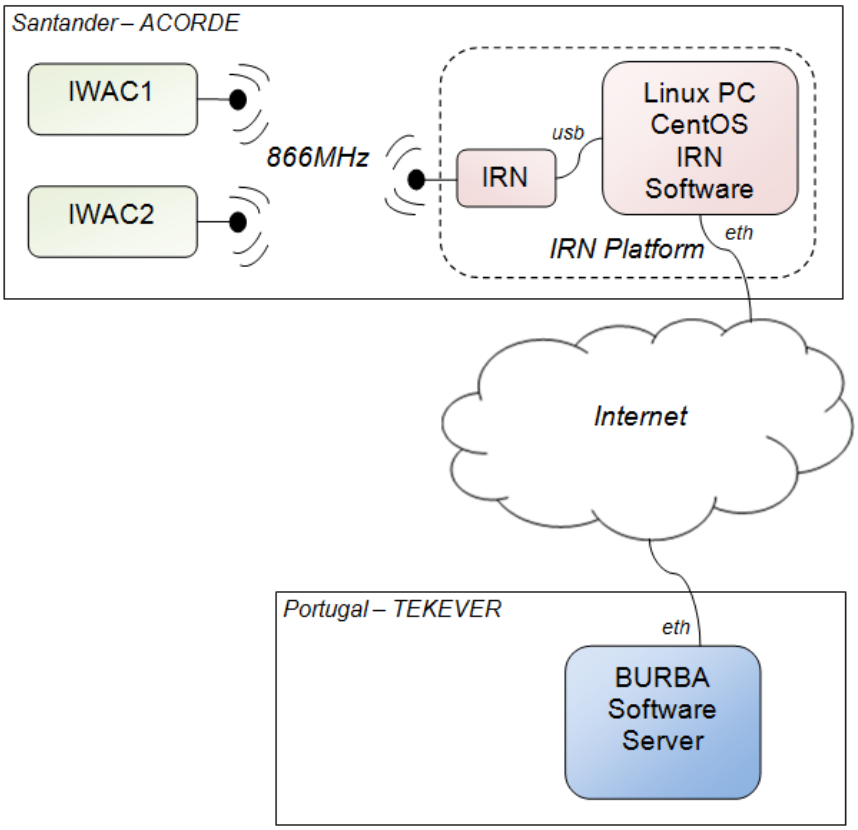


Figure 5: IWACs to DSS data exchange

The Task 5.2, of which the leader is Polimi, had the objective to test the integrated HW and SW system. In this way the system was validated comparing the design specification derived in WP2 and according to a test plan defined in parallel with the integration process. Therefore, through this activity, Polimi had to carry out the procedures to verify the functionalities of the system. Several tasks were scheduled in order to perform the test procedure (visible in Deliverable D5.3). The system was successfully tested with the participation of the technical partners.

Acorde was leader of the Task 5.3 that had the goal to carry out the physical integration of the first prototype. During this process the necessary customizations have been designed and put in place mainly in the mechanics of the container to host all the elements needed to transform a standard container into an IWAC. Once the integration process was finished, several tests were performed to validate the solution and the first BURBA IWAC demonstrated the design effectiveness. The results were included in Deliverable D5.2.

D'Appolonia, leader of the Task 5.4, dealt with production of the required replicas of the integrated IWACs to be used during the validation phase (refer to Figure 6).

The integration process was organized by the task leader preparing a technical specification were all the necessary steps to realize an IWAC were clearly identified. Each IWAC physical block was described in detail in order to make the process easily repeatable since the elements to be installed inside the IWAC were prepared by different partners. The integration was a successful example of consortium collaboration in order to reach the foreseen objectives.

The pilot implementation was performed at laboratory premises of D'Appolonia, for works related to prototype developments see Deliverable D5.4.

In order to make possible the on field test, some minor issues related with the RFID were handled by D'Appolonia: all the RFID tagged bags and User RFID identification cards were inventoried and distributed to Municipalities. Each municipality arranged public events in order to explain the citizens how the system works. D'Appolonia took care of identifiers tracking in order to keep trace of the distribution process.

The replicas were internally tested according to a Factory Acceptance Test (FAT) before the deployment in the municipalities; functionality tests were arranged simulating a normal disposal procedure.

Figure 6: Pilot Implementation

Concerning the validation stage (WP 6), it represents the final validation step of BURBA project. It was split into two tasks:

- Task 6.1 (Leader: Polimi): System validation;

- Task 6.2 (Leader: D'Appolonia): Data Collection.

The first one was related to the validation of pilot developed in real environment of the three municipalities involved (Camogli, Santander, Rzeszow).
According to the amended DoW, D'Appolonia, Acorde and Tekever were in charge of supporting municipalities during the on field system setup and configuration.
In general in each Municipality, in order to perform the validation tests, first of all, the IRN was physically installed, then IRN-IWACs communication was checked. Finally, through the IRN, the data collected during the normal procedure of waste disposal, were checked and the procedure itself was validated (for further details refer to Deliverable D6.1). Furthermore, after the tests, activities of maintenance were performed (e.g. battery recharge, SW and HW issues).
Below some picture of the system validation in the three municipalities; in particular Figure 7 is the validation in Camogli, Figure 8 in Rzeszow and Figure 9 in Santander.

Figure 7: Validation stage in Camogli

Figure 8: Validation stage in Rzeszow

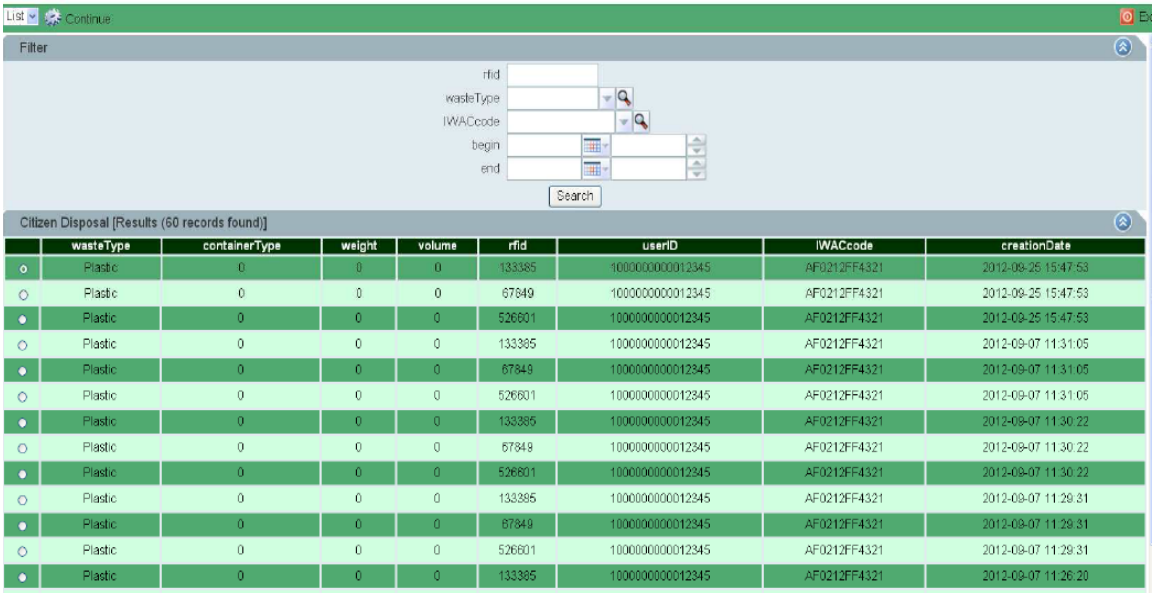
Figure 9: Validation stage in Santander

In Camogli three IWACs were installed for plastic fraction. The tests results were satisfactory after some initial issues also because it was the first setup. There were minor problems that didn't significantly affect the validation (weighting system).

In Rzeszow four IWACs were installed (two for the paper and two for the plastic).
The tests results were satisfactory even if some minor problems arose on weighting system. Nevertheless it has been proved the functionalities of the whole system.

In Santander two IWACs were installed (one for the paper and one for the organic).

In Santander the trials were satisfactory too. It was confirmed the unreliability of weighting data as seen in the other setups. Even in this trial setup the system worked as planned and it was possible to obtain the necessary data to validate the system.



	wasteType	containerType	weight	volume	rfid	userID	IWACcode	creationDate
○	Plastic	0	0	0	133385	1000000000012345	AF0212FF4321	2012-09-25 15:47:53
○	Plastic	0	0	0	67849	1000000000012345	AF0212FF4321	2012-09-25 15:47:53
●	Plastic	0	0	0	526601	1000000000012345	AF0212FF4321	2012-09-25 15:47:53
○	Plastic	0	0	0	133385	1000000000012345	AF0212FF4321	2012-09-07 11:31:05
●	Plastic	0	0	0	67849	1000000000012345	AF0212FF4321	2012-09-07 11:31:05
○	Plastic	0	0	0	526601	1000000000012345	AF0212FF4321	2012-09-07 11:31:05
●	Plastic	0	0	0	133385	1000000000012345	AF0212FF4321	2012-09-07 11:30:22
○	Plastic	0	0	0	67849	1000000000012345	AF0212FF4321	2012-09-07 11:30:22
●	Plastic	0	0	0	526601	1000000000012345	AF0212FF4321	2012-09-07 11:30:22
○	Plastic	0	0	0	133385	1000000000012345	AF0212FF4321	2012-09-07 11:29:31
●	Plastic	0	0	0	67849	1000000000012345	AF0212FF4321	2012-09-07 11:29:31
○	Plastic	0	0	0	526601	1000000000012345	AF0212FF4321	2012-09-07 11:29:31
●	Plastic	0	0	0	133385	1000000000012345	AF0212FF4321	2012-09-07 11:26:20

Figure 10: Screenshot of BURBA portal concerning the waste disposal

Concerning the task 6.2**,** D'Appolonia (the task leader) dealt with data collection. It has been collected a considerable amount of data through the Burba information system (example shown in Figure 10) that made possible to D'Appolonia to perform statistical elaboration and to reach conclusions. The data coming from the RFID identification both of user and waste allowed to have combined data that can be very useful to trace habits or to check the correct user behavior. The limit of RFID technology is represented by the fact that the commercial products do not have their own RFID identifier and to overcome this lack (in fact the barcode is not still replaced from RFID) for BURBA purposes the RFID labelling was done at bag level. This allows affirming that, once each piece of waste will have its RFID, the BURBA system, that has fully passed the tests validating the methodology, with further improvements to make it a commercial system, could be ready to a large scale integration. A full description of the activities done for this task is written in the Deliverable D6.2.

The WP 7 concerned the dissemination activities of the project.
This was split in the following tasks:

- Task 7.1 (Leader: D'Appolonia) related to Web-site realization and other dissemination activities;
- Task 7.2 (Leader: Kontor 46) related to Business model and way to market;
- Task 7.3 (Leader: Kontor 46) related to IPR review and patenting process.

Therefore the dissemination activities were carried out during the whole project, in particular D'Appolonia within the Task 7.1 after developing it at the beginning, maintained and updated the dynamic and interactive web site throughout the project. Besides the web site as project dissemination D'Appolonia and Kontor 46 promoted BURBA results. Moreover D'Appolonia dealt with the planning of the possible dissemination activities; regarding dissemination activities and co-operation with other projects/program D'Appolonia and Kontor 46 presented directly BURBA project in several international events:

- 17th International Trade Fair of Material and Energy Recovery and Substainable Development, named Ecomondo 2012, on 8th November 2012 (in Rimini, Italy);
- ICSWM (International on Integrated Urban Solid Waste Management), on 26th of June 2013 (in Pisa, Italy); Sardinia Symposium 2013, on 1st of October 2013 (in Santa Margherita di Pula, Italy).

In particular the Deliverable D7.1 described the activities performed to realize BURBA website, the Deliverable D7.2 defined the dissemination plan for increase the awareness of BURBA system towards the a wide audience, and finally the Deliverable D7.3 described the activities carried out to participate in the workshops for a better dissemination of the project.
Concerning the Task 7.2 (named "Business model and way to market" of which the leader is Kontor 46), it aimed at developing a business plan in order to have an overview of the international market and understand potential of the final system. Costs for maintenance of the system were taken into account too. A strategic marketing plan was prepared by Kontor 46 that proposed a scheme identifying four possible configurations of the system (on HW side) according to different services offered by each solution. The versions are: Ultra Light 2013, Light, Standard and Full.
This first version, named Ultra Light 2013, responds therefore to the present market needs. It is a cheap version for immediate use, although it is appears simplified compared to the final versions: the parts are reduced to the essential.
The "Light" version has only the essential HW and could be economically affordable, "Full" version is the most complete solution and "Standard" is a balanced version between Light and Full.
The classification of the four versions is related to the level of complexity and features offered both at HW and SW stage. An evaluation of the costs of the different configurations has been performed and all the consideration can be found in D7.4.

Concerning the Task 7.3 (named "IPR review and patenting process" of which the leader is Kontor 46), the task goal was to manage the Intellectual Property exploitation in order to be able to offer the platform to the scientific community. Kontor 46 has performed a final IPR review checking all items (Hardware and Software) in relation to IPR issues (for further details refer to Deliverable D7.5). There are no technologies or single items that need a patent (a part from previous patents explicitly reported on DoW). The whole BURBA solution should be object of a global patent for its high level of novelty especially the only item patentable would be the whole system. Currently it is not possible to create a patent because the system developed is a prototype and it is far away from its launching in the industrial market.

Finally, as general consideration, the aspects that can be improved on the base of the work carried out regard the following issues:

- The refitting of a standard waste container does not guarantee a satisfactory reliability. To extend the usage of the IWAC on a large scale application the design of a new container mold should be one of the necessary element;
- As a results coming from pilot implementation and the trials, the weighting system should be improved. The measures obtained were not as reliable as expected due to container characteristics and to the solution applied on the IWACs prototypes;
- The usage of RFID tags technology is currently not applied on a large scale to mark products and packages. This lack from the market limits the usage of the "bulk" waste that must be collected on a tagged bag in order to be detected from the IWAC;
- During the project there were no elements to submit a Patent. The consortium identified the whole BURBA system as patentable once designed for a large scale application hence after an industrialization process.

1.4 Potential impact and the main dissemination activities and the exploitation of results

Potential impacts which can arise from BURBA include:

- New concept of waste service through the entire chain from production to disposal;
- Waste management optimisation;
- Timely provision of surveillance data, thanks to new technologies;
- Decrease delay in reporting and data acquisition;
- System enabling sociological studies, marketing studies on the basis of the data generated;
- Improved feedback / strengthen feedback loops;
- Feedback information to individual user (or group of users) motivational and educational as well as right information of the citizen;
- Feedback and statistics for producers and sellers of RFID marked goods, undergoing regulatory constraints;
- Support Rewarding policy for intelligent waste disposing citizen based on actual individual data.

Besides the creation of an official website (www.burbaproject.net), many activities were performed in order to disseminate the intermediate or final results of the project throughout the whole period. These activities were the following:

- Leaflets to be distributed during the conferences (different types were created based on different results achieved throughout the project);
- Poster;
- Creation of BURBA Facebook group;
- Creation of mailing list to be contacted and was contacted;
- Each Municipality use its official website to disseminate the project;
- Videos published on You Tube: one video for each demonstration of BURBA system use during the demo in the Municipalities Camogli and Rzeszow;
- Press release:
    - The most famous financial newspaper of Italy "Il Sole 24 ore" dedicated a special edition to Ecomondo 2012 Fair. D'Appolonia attended this fair and exploited an article dedicated to BURBA;
    - Italian newspaper "Il Secolo XIX" dedicated an article concerning the 24th Month BURBA meeting held in Camogli on February 2013.
- Interview to D'Appolonia reference on Channel "Class Tv" held on 23rd of September 2013;
- Finally the partners attended many events and these were the following:
    - D'Appolonia attended a workshop named "Solid Waste Management and Processing" in Brussels on 25th January 2012. During the workshop, D'Appolonia with an Advisory Board (representative of Italian Waste Management Company named AMIU) disseminated through a presentation the project with its objectives and results;
    - D'Appolonia and Kontor 46 participated to "Smart Cities" conference arranged in Turin on 23rd February 2012. During the conference, D'Appolonia and Kontor 46 distributed dissemination leaflets containing project summary and objectives;
    - D'Appolonia with Kontor 46 attended (on 21st of June 2012) the event IoT Week 2012 Venice through a presentation of the project (besides poster and leaflets);
    - D'Appolonia presented (on 8th November 2012) the project at the 17th International Trade Fair of Material and Energy Recovery and Substainable Development, named Ecomondo 2012;

- D'Appolonia presented the project on 26th of June 2013, during rge ICSWM (International on Integrated Urban Solid Waste Management) held at Sant'Anna School of Advance Studies in Pisa.
- D'Appolonia wrote a scientific paper and presented the project during Sardinia Symposium 2013 on 1st of October 2013.

The exploitation of the results brought by BURBA system was the following:

- Advanced RFID equipment integrated in the sensing electronics positioned inside intelligent waste containers (IWACs) for user and waste classification;
- LBS (Location Based Service) citizen-centred for waste management segregation and disposal, system that enables the citizen to know through the cell-phone where, when and what waste can be disposed of;
- LBS application and technology used for positioning of waste containers in urban areas;
- Technological developments for the power source for the intelligent container electronics pack;
- Citizen's Waste management IT tools innovation exploiting accurate position (in real-time LBS) and RFID to improve service (sorting, billing, educational and motivational feedback);
- Waste service management IT tools innovation exploiting accurate position in real-time and RFID to improve service;
- Intelligent Waste Containers (IWACs) design.

1.5 Address of project public website and relevant contact details

The address of Burba website is the following:

www.burbaproject.net

The site was divided into several sections:

- Home;
- Project;
- Partners;
- News Archive
- Documents;
- Useful Links;
- Login.

In the "Home" there are latest news about meetings, actions and deadlines of the project.
In the "Project" section the information about project can be found, mostly about the tasks active at the moment.
The "Partner Links" is the section, as the same title says, that visualises the partners name and symbol, but also through links allows accessing to their web sites. In this way everybody can know the BURBA partners and their specializations.
The "News Archive" section stores the oldest news and allows to classify these according to period of article submission
In the "Useful Links" section the user finds some more links related to the project, such as the European Commission CORDIS and Seventh Framework Program links.
All sections so far described are public; instead the "Documents" and "Events Calendar" sections are reserved to the BURBA partners. The first section is dedicated to the documentation to be

shared within the Consortium, on the other hand, the second one is devoted to calendar fixing the main events to be exploited for the dissemination.

In this way the website provides the following features:

- Technical and public information on the project activities and structure, accessible to the general public, project abstracts, main results and the latest developments. This kind of information will be taken from the dissemination reports and sent in email newsletters to registered web site users.
- Listing of contact points of the entities involved: consortium members and in general, all organisations involved.
- Collection of relevant web sites of interest to the project such as companies, institutions, complementary work, etc.
- Reference material and results produced within the project itself, including public deliverables.
- Database for literature and other Projects connected to BURBA.
- Calendar of most important conferences, seminars, workshops, meetings and events linked to BURBA together with related presentation material.

The reference contact details are the following: simona.bruna@dappolonia.it or ivo.cassissa@dappolonia.it.

2 Use and dissemination of foreground

2.1 Section A – Dissemination measures

A1: LIST OF SCIENTIFIC PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES										
NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Is/Will open access[1] provided to this publication?	Type
1	BURBA (Bottom Up selection, collection and management of URBAn waste)	C. LAUNO*, I. M. CASSISSA*, S. BRUNA*, E. LOPEZ CASARIEGO**, S. MIER**, P. ANTONIO***, P. BARATTINI****, M. BONASSO****, A. ROVETTA***** *D'Appolonia, Via S.Nazaro 19, 16145 Genova, Italy**Acorde Technologies S.A., PCT Albert Einstein 6, 39011 Santander,	14th International Waste Management and Landfill Symposium (Sardinia 2013)		CISA Publisher	Via Beato Pellegrino, 23 I – 35137 Padova Italy	30/09/2013		no	Paper in Proceedings of a Conference/ Workshop

[1] Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

A1: LIST OF SCIENTIFIC PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES										
NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Is/Will open access[1] provided to this publication?	Type
		Spain***Tekever, Rua das Musas 3.30, 1990-113 Lisbon Portugal****Ridgeback s.a.s., Via San Francesco da Paola 6, 10123 Turin, Italy*****Politecnico di Milano, Via Lamasa 1, 20156 Milan, Italy								
2	BURBA (Bottom Up selection, collection and management of URBAn waste)	Carolina Launo, Ivo Maria Cassissa, Simona Bruna D'Appolonia S.p.A., Silvia Mier Acorde Technologies S.A, Pedro Santo Antonio Tekever , Paolo Barattini, Matteo Bonasso Ridgeback S.A.S. , Alberto Rovetta Politecnico di Milano,	16th International Trade Fair of Material & Energy Recovery and Sustainable Development, (ECOMONDO 2012)		Maggioli Editori	Via Del Carpino, 8 47822 Santarcangelo di Romagna (RN) Italy	07/11/2012		yes	Paper in Proceedings of a Conference/ Workshop

A2: LIST OF DISSEMINATION ACTIVITIES								
NO.	Type of activities[2]	Main leader	Title	Date	Place	Type of audience[3]	Size of audience	Countries addressed
1	Media briefings	KONTOR 46 DI BONASSO MATTEO SAS	BURBA Project Group	01/03/2011	Facebook	Medias		World wide
2	Media briefings	KONTOR 46 DI BONASSO MATTEO SAS	BURBA Mailing List	01/03/2011	Mailing list	Scientific community (higher education, Research) - Industry - Medias		World wide
3	Web sites/Applications	D'APPOLONIA SPA	BURBA web site	01/03/2011	Official BURBA web site	Scientific community (higher education, Research) - Industry - Medias		World wide
4	Web sites/Applications	AYUNTAMIENTO DE SANTANDER	BURBA	01/01/2012	Official Web Site of Santander Municipality	Civil society - Medias		Santander (Spain)
5	Web sites/Applications	GMINA MIASTO RZESZOW	BURBA	01/01/2012	Official Web Site of Rzeszow Municipality	Civil society - Medias		Rzeszow (Poland)
6	Web sites/Applications	COMUNE CAMOGLI	BURBA	01/01/2012	Official Web Site of	Civil society - Medias		Camogli (Italy)

[2] A drop down list allows choosing the dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters, Other.

[3] A drop down list allows choosing the type of public: Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias ('multiple choices' is possible.

A2: LIST OF DISSEMINATION ACTIVITIES								
NO.	Type of activities[2]	Main leader	Title	Date	Place	Type of audience[3]	Size of audience	Countries addressed
					Camogli Municipality			
7	Oral presentation to a scientific event	D'APPOLONIA SPA	BURBA	25/01/2012	"Solid Waste Management and Processing" in Brussels	Scientific community (higher education, Research)		Europe
8	Posters	D'APPOLONIA SPA	BURBA	23/02/2012	"Le Smart Cities dell'ANCI" in Turin (Italy)	Civil society - Policy makers		Italy
9	Flyers	RIDGEBACK S.A.S. DI PAOLO BARATTINI & C.	BURBA	23/02/2012	"Le Smart Cities dell'ANCI" in Turin (Italy)	Civil society - Policy makers		Italy
10	Oral presentation to a scientific event	D'APPOLONIA SPA	BURBA	21/06/2012	IoT Week 2012 in Venice (Italy)	Scientific community (higher education, Research)		Europe
11	Oral presentation to a scientific event	RIDGEBACK S.A.S. DI PAOLO BARATTINI & C.	Life Cycle Analysis and environmental impacts	21/06/2012	IoT Week 2012 in Venice (Italy)	Scientific community (higher education, Research)		Europe
12	Oral presentation to a wider public	RIDGEBACK S.A.S. DI PAOLO BARATTINI & C.	Privacy and legal issues	21/06/2012	IoT Week 2012 in Venice (Italy)	Scientific community (higher education, Research)		Europe
13	Flyers	D'APPOLONIA	BURBA	21/06/2012	IoT Week	Scientific		Europe

A2: LIST OF DISSEMINATION ACTIVITIES								
NO.	Type of activities[2]	Main leader	Title	Date	Place	Type of audience[3]	Size of audience	Countries addressed
		SPA			2012 in Venice (Italy)	community (higher education, Research)		
14	Posters	RIDGEBACK S.A.S. DI PAOLO BARATTINI & C.	BURBA	21/06/2012	IoT Week 2012 in Venice (Italy)	Scientific community (higher education, Research)		Europe
15	Articles published in the popular press	D'APPOLONIA SPA	Il cassonetto diventa "intelligente"	05/11/2012	Ecomondo 2012 in Rimini (Italy)	Scientific community (higher education, Research) - Industry		Italy
16	Oral presentation to a wider public	D'APPOLONIA SPA	BURBA	08/11/2012	Ecomondo 2012 in Rimini (Italy)	Scientific community (higher education, Research) - Industry		Europe
17	Posters	RIDGEBACK S.A.S. DI PAOLO BARATTINI & C.	Life Cycle Analysis and environmental products: the case of the Intelligent Waste Container	08/11/2012	Ecomondo 2012 in Rimini (Italy)	Scientific community (higher education, Research) - Industry		Europe
18	Oral presentation to a scientific event	D'APPOLONIA SPA	BURBA	27/06/2013	ICSWM 2013 in Pisa (Italy)	Scientific community (higher education,		Europe

A2: LIST OF DISSEMINATION ACTIVITIES								
NO.	Type of activities[2]	Main leader	Title	Date	Place	Type of audience[3]	Size of audience	Countries addressed
						Research)		
19	Posters	D'APPOLONIA SPA	BURBA	27/06/2013	ICSWM 2013 in Pisa (Italy)	Scientific community (higher education, Research)		Europe
20	Flyers	D'APPOLONIA SPA	BURBA	27/06/2013	ICSWM 2013 in Pisa (Italy)	Scientific community (higher education, Research)		Europe
21	Interviews	D'APPOLONIA SPA	IWAC arrivano i cassonetti intelligenti	23/09/2013	Class Meteo in Milan (Italy)	Civil society - Medias		Italy
22	Oral presentation to a wider public	D'APPOLONIA SPA	BURBA	01/10/2013	Sardinia Symposium 2013 in Santa Margherita di Pula (Italy)	Scientific community (higher education, Research)		Europe
23	Posters	D'APPOLONIA SPA	BURBA	01/10/2013	Sardinia Symposium 2013 in Santa Margherita di Pula (Italy)	Scientific community (higher education, Research)		Europe
24	Flyers	D'APPOLONIA SPA	BURBA	01/10/2013	Sardinia Symposium 2013 in Santa Margherita di	Scientific community (higher education, Research)		Europe

A2: LIST OF DISSEMINATION ACTIVITIES								
NO.	Type of activities[2]	Main leader	Title	Date	Place	Type of audience[3]	Size of audience	Countries addressed
					Pula (Italy)			
25	Flyers	COMUNE CAMOGLI	BURBA	01/11/2013	Camogli (Italy)	Civil society		Camogli (Italy)
26	Flyers	AYUNTAMIENTO DE SANTANDER	BURBA	01/11/2013	Santander (Spain)	Civil society		Santander (Spain)
27	Flyers	GMINA MIASTO RZESZOW	BURBA	01/11/2013	Rzeszow (Poland)	Civil society		Rzeszow (Poland)
28	Oral presentation to a wider public	POLITECNICO DI MILANO	Life Cycle Assessment of the Intelligent Waste Container	14/11/2013	Italy-China Innovation Meeting in Peking (China)	Scientific community (higher education, Research) - Industry		China-Italy
29	Articles published in the popular press	D'APPOLONIA SPA	Arrivano i cassonetti "intelligenti" per la plastica	18/11/2013	Secolo XIX in Genova (Italy)	Medias		Italy
30	Videos	KONTOR 46 DI BONASSO MATTEO SAS	Rzeszow BURBA PROJECT 2013 DEMONSTRATION FP7	05/02/2014	Youtube	Medias		World wide
31	Videos	KONTOR 46 DI BONASSO MATTEO SAS	BURBA PROJECT DEMONSTRATION FP7 Camogli ITALY	05/02/2014	YouTube	Medias		World wide

2.2 Section B – Exploitable foreground

B2: OVERVIEW TABLE WITH EXPLOITABLE FOREGROUND								
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	Electronics to be integrated in a waste container for the automatic waste management	Yes		Electronic board	All sectors in which an intelligent waste container is required	2015	Ownership, patenting	Acorde
Commercial exploitation of R&D results	Handling of data from waste management	Yes		BURBA software	All sectors in which the handling of data from waste management (in urban area) is required	2015	Ownership, licensing	Tekever
Commercial exploitation of R&D results	System (waste container integrated with the electronics and	Yes		BURBA system	Waste management in urban area	2015	Ownership	D'Appolonia, Acorde, Tekever

[4] 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

B2: OVERVIEW TABLE WITH EXPLOITABLE FOREGROUND								
Type of Exploitable Foreground[4]	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyy	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
	software) for the automatic waste magement							

3 Report on societal implications

General Information *(completed automatically when **Grant Agreement number** is entered.*

Grant Agreement Number:	265177
Title of Project:	Bottom Up selection, collection and management of URBAn waste
Name and Title of Coordinator:	Mr. Ivo Cassissa

A 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) :	
RESEARCH ON HUMANS	
• Did the project involve children?	*NO*
• Did the project involve patients?	*NO*
• Did the project involve persons not able to give consent?	*NO*
• Did the project involve adult healthy volunteers?	*NO*
• Did the project involve Human genetic material?	*NO*
• Did the project involve Human biological samples?	*NO*
• Did the project involve Human data collection?	*NO*
RESEARCH ON HUMAN EMBRYO/FOETUS	
• Did the project involve Human Embryos?	*NO*
• Did the project involve Human Foetal Tissue / Cells?	*NO*
• Did the project involve Human Embryonic Stem Cells (hESCs)?	*NO*
• Did the project on human Embryonic Stem Cells involve cells in culture?	*NO*
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	*NO*
PRIVACY	
• Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	*NO*
• Did the project involve tracking the location or observation of people?	*NO*
RESEARCH ON ANIMALS	
• Did the project involve research on animals?	*NO*
• Were those animals transgenic small laboratory animals?	*NO*
• Were those animals transgenic farm animals?	*NO*
• Were those animals cloned farm animals?	*NO*
• Were those animals non-human primates?	*NO*
RESEARCH INVOLVING DEVELOPING COUNTRIES	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	*NO*
• Was the project of benefit to local community (capacity building, access to healthcare, education	*NO*

etc)?	
DUAL USE	
• Research having direct military use	*NO*
• Research having the potential for terrorist abuse	*NO*

B 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	1	1
Work package leaders	1	6
Experienced researchers (i.e. PhD holders)	0	1
PhD Students	0	2
Other	4	2

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	2
Of which, indicate the number of men:	1

C Gender Aspects

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

D 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

⊗ No

E Interdisciplinarity

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

○ Main discipline[6]: 2.2

○ Associated discipline[6]: 2.3 | ○ Associated discipline[6]:5.2

F 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

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		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		Regional Policy	
Development Economic and Monetary Affairs		Affairs		Research and Innovation	
Education, Training, Youth		Food Safety		Space	
Employment and Social Affairs		Foreign and Security Policy		Taxation	
		Fraud		Transport	
		Humanitarian aid			

13c If Yes, at which level?

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

G Use and dissemination

14. How many Articles were published/accepted for publication in peer-reviewed journals?	**2**
To how many of these is open access[7] provided?	**1**
How many of these are published in open access journals?	**1**
How many of these are published in open repositories?	**0**
To how many of these is open access not provided?	**1**
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).*		**0**
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	**0**
	Registered design	**0**
	Other	**0**
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:		**0**

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		

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:	*0*

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

Difficult to estimate / not possible to quantify	☒

H Media and Communication to the general public

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

No

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

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)		

BURBA Material

Two video on **You Tube** related to Demo Phase in Rzeszow and Camogli Municipalities.

Rzeszow:

https://www.youtube.com/watch?v=AuZ2cS2QYE8&feature=em-upload_owner#action=share

Camogli:

https://www.youtube.com/watch?v=goWVk4adunI


burba


RACCOLTA DIFFERENZ
IMBALLAGGI IN PLAS


RACCOLTA
PLASTICA
zona
traffico limitato


PLASTIK
bwrba
SUCHE


PLASTIK
bwrba


RESTOS
27/01/2014


PAPEL
SANTANDER

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4	Kontor 46	High Tech Projects Expert	+39 017 25 75 087	
5	Tekever	Technical Partner	+351 213 304 300	+351 213 304 301
6	AOTO	Pilot Implementation	+86 21 5642 8884	+86 21 6669 0583
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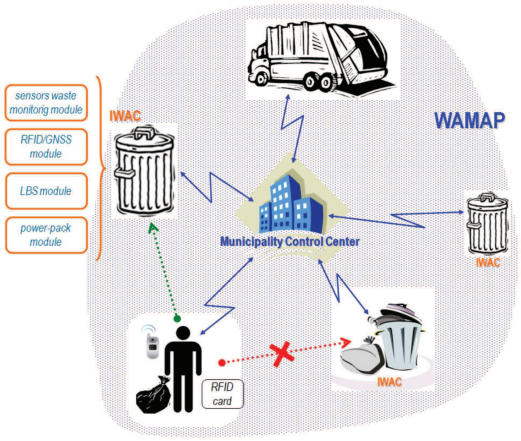
8	Santander Municipality	Municipality	+34 942 200 600	+34 942 200 730
9	Rzeszow Municipality	Municipality	+48 017 87 54 742	+48 017 87 54 747

BURBA - Bottom Up selection, collection and management of URBAn waste



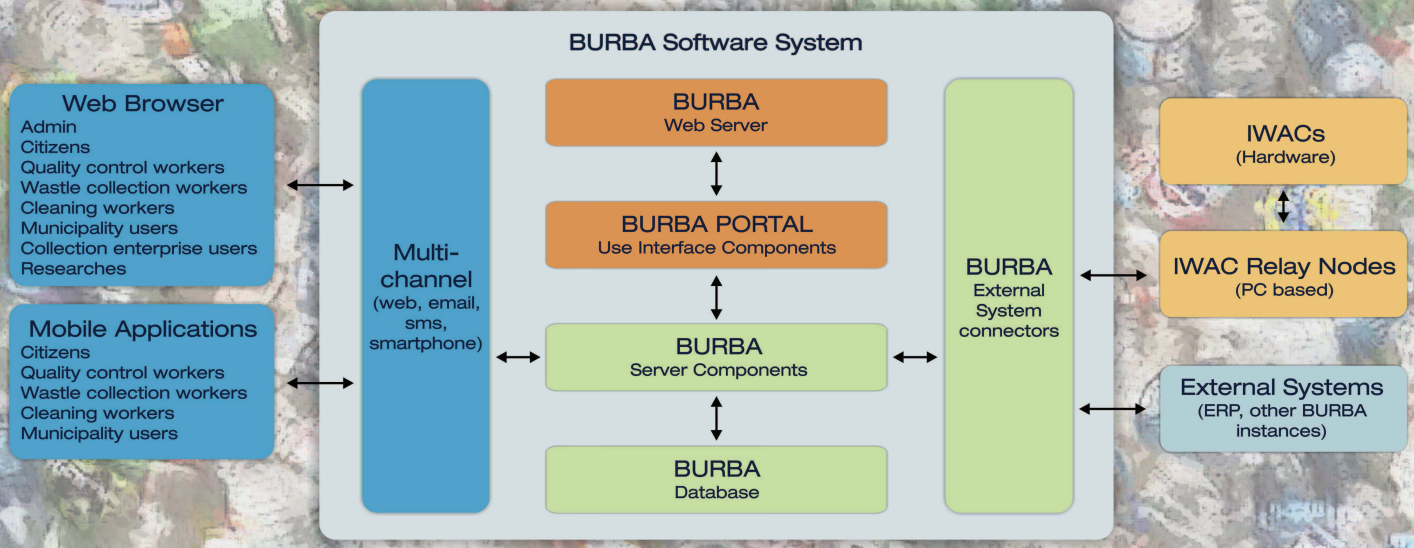
Main objectives addressed by BURBA are:

- promoting sustainable management of the natural and human environment and its resources by advancing knowledge on interactions among biosphere, ecosystem and human activities.
- developing new technologies, tools and services, in order to address in an integrated way global environmental issues.
- allowing a more efficient and sustainable waste management system promoting higher life quality and fewer costs for the city authorities and less impact on the environment.

BURBA project proposes an innovative method of optimization of the waste management through the application of RFID and LBS technologies integrated into a network of intelligent waste containers (IWAC) for its use in densely populated areas.

The IWAC (Intelligent Waste Container) will be able to identify the citizen/user through a personal RFID card, to control (e.g. lock/unlock) the lid and, therefore, to give feedback about the correct disposal by the user. The IWAC will be able to identify items marked with RFID tags and will be marked itself with an RFID for redundant identification in case of failure of electronics.

Taking advantage of RFID's ability to identify individual/groups of users/citizens and the kind of waste being disposed and correctly separated, municipalities might create incentive-based recycling programs that reward customers for the amount they recycle and/or charge proportionally to the amount of the generated waste, while minimizing the amount of trash headed for the landfill.



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Partner del consorzio

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burba

BURBA
Bottom Up selection, collection and management of URBAn waste

www.burbaproject.net

Burba project funded by the European Commission under the Seventh Framework Program (FP7) develops innovative technology for the separation and collection of waste at source

The developed products are teh following:
- **"intelligent" waste container**
- **mobile app**
- **waste collection fleet management system**

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- promoting sustainable management of the natural and human environment and its resources by advancing knowledge on interactions among biosphere, ecosystem and human activities
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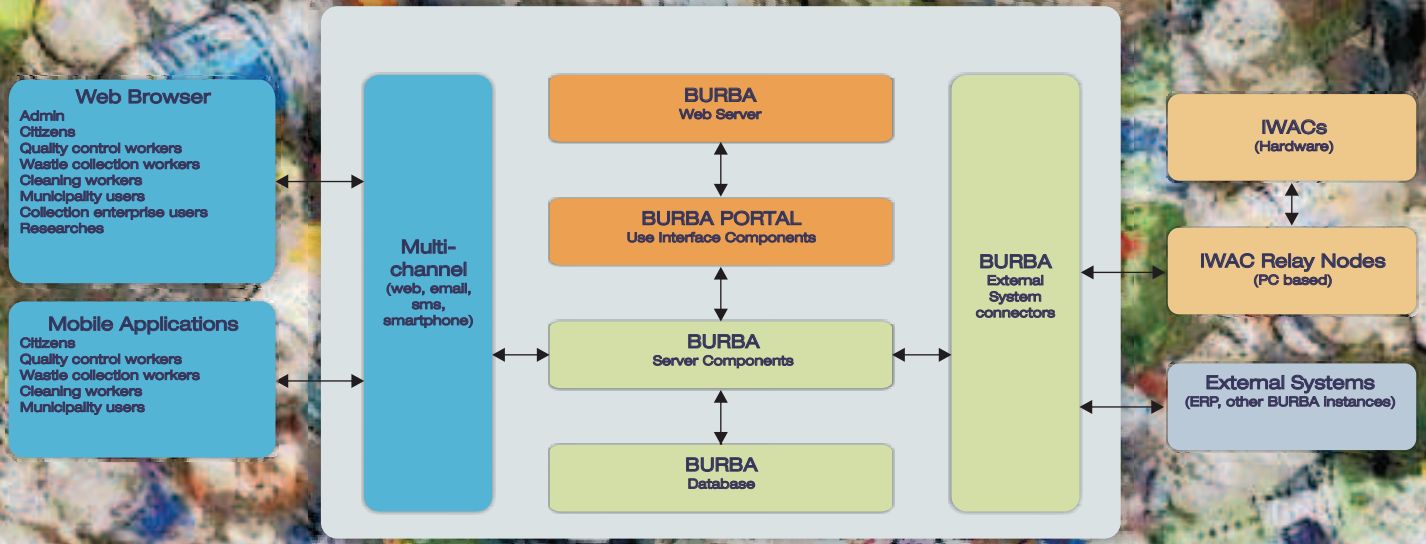

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Il progetto BURBA finanziato dalla Commissione Europea sotto il Programma Settimo Quadro sviluppa tecnologia innovativa per la separazione e la raccolta dei rifiuti
Il Comune di Camogli (partner ufficiale del progetto) partecipa alla fase di validazione del prototipo coinvolgendo i cittadini.

SEVENTH FRAMEWORK PROGRAMME

Comune di Camogli

I prodotti sviluppati sono i seguenti:

- cassonetto dei rifiuti "intelligente»
- applicazione per cellulare
- sistema di gestione raccolta rifiuti per i camion

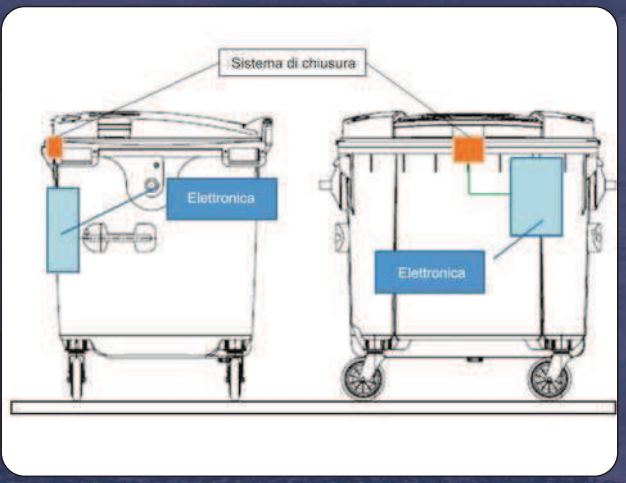
Da ottobre con conclusione entro la fine dell'anno corrente 5 Cassonetti Intelligenti verranno installati presso la città di Camogli esattamente nei punti indicati nella cartina della cittadina. I cittadini dovranno a partecipare alla validazione del sistema e prima dell'inizio della fase delle giornate di addestramento saranno organizzate. Altri comuni partecipano a questa iniziativa e sono: Santander in Spagna e Rzeszow in Polonia. Tutti e tre i Municipi collaboreranno tra loro per scambiarsi anche l'esperienza fatta e trarne vantaggio tutti quanti

Gli obbiettivi principali affrontati da BURBA sono:

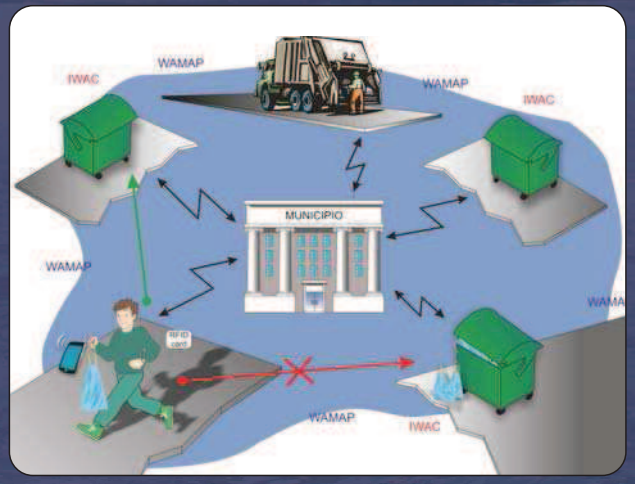
- Promuovere la gestione sostenibile dell'ambiente naturale e umano e delle sue risorse mediante l'approfondimento delle conoscenze sulle interazioni tra biosfera, ecosistema e attività umane;
- Sviluppare nuove tecnologie, strumenti e servizi, al fine di affrontare in un modo integrato le problematiche ambientali globali;
- Consentire un più efficiente e sostenbile sistema di gestione dei rifiuti che promuova una più alta qualità di vita e costi minori per l'amministrazione della città e meno impatto sull'ambiente.

Il progetto BURBA propone un metodo innovativo di ottimizzazione della gestione dei rifiuti attraverso l'applicazione di tecnologie integrate in una rete di cassonetti della spazzatura intelligenti (IWAC) per il suo uso in aree densamente popolate. L' IWAC sarà in grado di identificare gli utenti attraverso una carta RFID personale, per controllare (ad esempio blocco/sblocco) il coperchio e, pertanto, dare feedback sul corretto smaltimento da parte dell'utente. L'IWAC sarà in grado di identificare elementi marcati con etichette RFID e sarà marcato lui stesso con un RFID per identificazione ridondante in caso di guasto dell'elettronica. Prendendo vantaggio dalla capacità della tecnologia RFID di identificare singoli/gruppi di utenti e il tipo di spazzatura correttamente separato, i municipi potrebbero creare programmi di riciclaggio basati su incentivi che ricompensano i cittadini per la quantità che riciclano e/o un onere proporzionalmente alla quantità di spazzatura generata, diretta verso la discarica.

Esempio di cassonetto



Schema di distribuzione



Punti di raccolta nel comune di Camogli

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www.burbaproject.net

Projekt BURBA
finansowany przez Komisję Europejska w ramach 7. Programu Ramowego(FP7) rozwijający innowacyjną technologię segregacji oraz zbierania odpadów wyposażony w technologie takie jak:

SEVENTH FRAMEWORK PROGRAMME

Urzad Miasta Rzeszowa

- inteligentny kontener na smieci
- mobilna aplikacja
- system odpadów flota wywozu

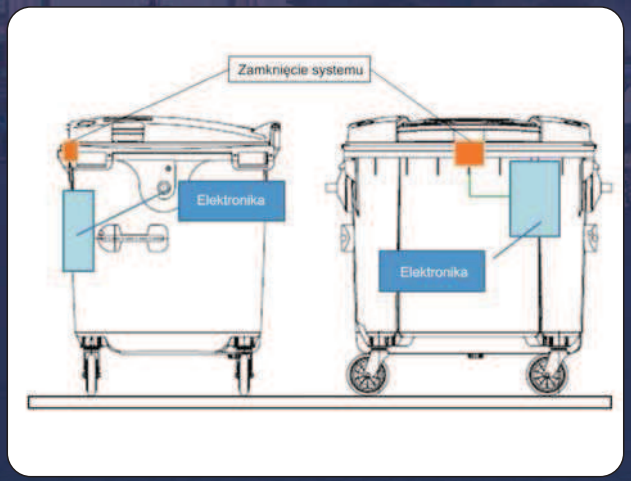
Pomiędzy wrześniem a listopadem zostanie zainstalowanych na terenie miasta Rzeszowa 4 inteligentnych kontenerów na papier i plastik w okolicach ul. Krośnieńskiej. Mieszkańcy będą uczestniczyć w testowaniu systemu. Przed rozpoczęciem okresu próbnego zorganizowane zostanie szkolenie.

Główne cele BURBA to:

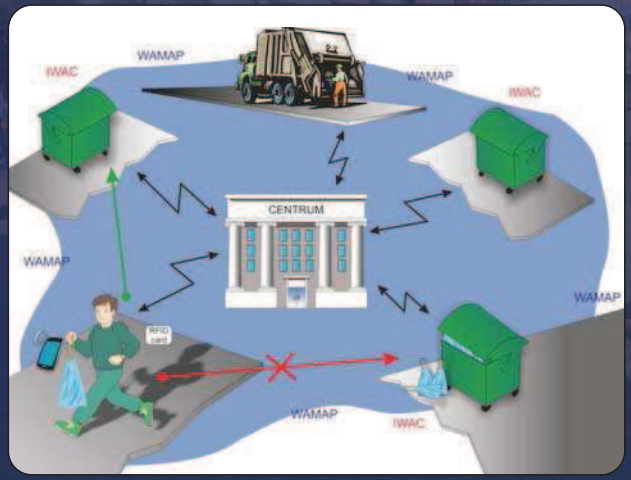
- Promocja zrównoważonego zarządzania ludzkim i naturalnym środowiskiem oraz jego zasobami poprzez zaawansowaną wiedzę i relacje pomiędzy biosferą, ekosystemem i ludzkimi czynnościami;
- Rozwój nowych technologii, narzędzi oraz usług w celu dotarcia w zintegrowany sposób do spraw środowiskowych;
- Bardziej wydajny oraz zrównoważony system zarządzania odpadami promujący wyższą jakość życia, niższe koszty oraz mniejszy negatywny wpływ na środowisko.

BURBA to projekt, który proponuje innowacyjną metodę optymalizacji gospodarki odpadami poprzez zastosowanie innowacyjnej technologii zintegrowanych w sieci inteligentnych kontenerów na odpady (IWAC) używanymi w gęsto zaludnionych obszarach. IWAC (Inteligentny Kontener Odpadów) będzie w stanie zidentyfikować mieszkańca/użytkownika poprzez osobistą kartę RFID oraz zapewnić informację na temat prawidłowego wyrzucania odpadów przez użytkownika. Dzięki zastosowaniu nowoczesnej technologii samorządy mogą stworzyć program recyklingu oparty na motywacji, który nagradza klientów za ilość odpadów przetworzonych minimalizując ilość śmieci przeznaczonych na wysypisko.

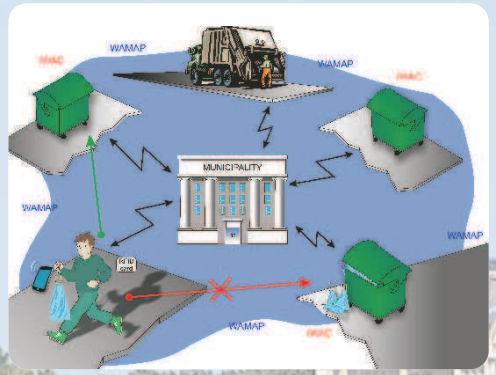
Przykład pojemnika na odpady



Program dystrybucji



Lokalizacja inteligentnych pojemników na odpady w mieście Rzeszowie



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El proyecto **BURBA,** fundado por la Comisión Europea bajo el Séptimo Programa Marco (FP7), desarrolla tecnología innovadora para la separacióny r ecogida de residuos. El **Ayuntamiento de Santander** (patrocinador oficial del proyecto) participa en la fase de validación del prototipo con la colaboración de los ciudadanos.

Los productos desarrollados son los siguientes:
- Contenedores de residuos inteligentes
- Aplicaciones en dispositivos móviles
- La fuente para un sistema de gestión de la flota de recogida de residuos

SEVENTH FRAMEWORK PROGRAMME

Proyecto BURBA

Es un proyecto de la Comunidad Europea centrado en la búsqueda de soluciones para la gestión municipal de los residuos sólidos basadas en tecnología y sistemas innovadores.

En él participan tanto administraciones públicas como empresas tecnológicas, centros de investigación y universidades de diversos países. El Ayuntamiento de Santander junto a los municipios de Camogli (Italia) y Rzeszow (Polonia) colabora como laboratorio experimental para su aplicación.

El Barrio San Francisco ha sido seleccionado como área de pruebas de la ciudad de Santander para la colocación de los contenedores inteligentes.

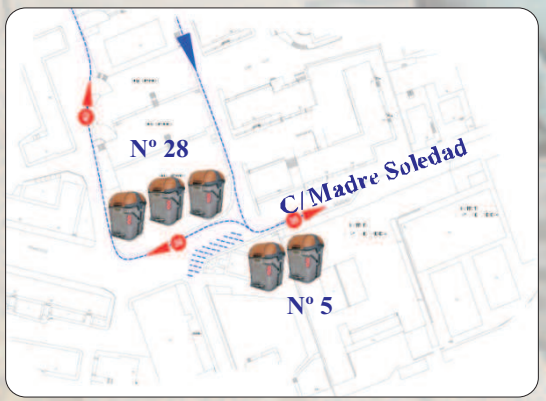
A partir de octubre de 2013 se llevará a cabo la fase de validación del sistema para lo cual se analizará la gestión de los residuos que realizan aquellos vecinos que deseen colaborar con el proyecto. Entre los participantes se repartirán tarjetas y bolsas de basura con tecnología RFID.

Previo a esta fase, se desarrollarán unas jornadas de formación para mostrar a los vecinos el funcionamiento del sistema y solicitar su colaboración.

OBJETIVOS

- Favorecer una gestión sostenible del medio y los recursos naturales.
- Desarrollar nuevas tecnologías, herramientas y servicios que ayuden a resolver de forma integrada las cuestiones ambientales globales.
- Permitir un sistema de gestión de residuos más eficiente y sostenible promoviendo una mayor calidad de vida así como menor impacto en el medio ambiente.

LOCALIZACIÓN DE CONTENEDORES INTELIGENTES (IWAC



Barrio San Francisco

FUNCIONAMIENTO

El proyecto BURBA propone un método innovador para mejorar la gestión de los residuos a través de tecnologías RFID y LBS integradas en una red de contenedores de residuos inteligentes **(IWAC)** para su uso en áreas con una elevada población.
Los IWAC (contenedores inteligentes) son capaces de identificar a los distintos usuarios del sistema a través de una tarjeta personal que controla las funciones de apertura y cierre de la tapa.
Además, cada bolsa de basura presenta una tarjeta RFID incorporada que difiere del resto en función del tipo de residuo que vaya a contener (envases, papel-cartón, restos). Con ello es posible determinar, a través del código RFID de las bolsas, si ésta se corresponde con el tipo de residuos para el cual está habilitado dicho contenedor .
El uso de este tipo de tecnología RFID resulta muy útil ya que permite recopilar una gran cantidad de información sobre el modo de operación de los usuarios, y con ello mejorar la gestión del servicio de recogida y tratamiento de los residuos e incentivar el reciclaje de residuos que de otra manera, acabarían en el vertedero.