THE ICT FOR AN INCLUSIVE URBAN DEVELOPMENT

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The focus of the panel relates to the use of the Information and Communication Technologies for Development and social inclusion, a topic that has been recognized as a priority both on national and international levels, as inferred by the guidelines of European programs such as Horizon2020 (2014-2020) or from the Call 'Smart cities and Social Innovation' (MIUR, Italian Ministry of Education, University and Research).
'Social Innovation' is to be included as a part of the field of research and work of ICT4D (Information and Communication Technologies for Development) which, in fact, refers to the use of information and communication technologies in the field of international, socio-economic development and human rights. Possible implementations of ICT4D, between which it is intended to be done a comparison, concern, on one hand the methods and techniques of participation of the local community in identifying problems and resources and on the other hand the use and the integration of data collected in a relation with the database and the planning tools used by administrators and policy makers, as a basis for future interventions.
The use of ICTs technology platforms such as websites, wikis, interactive geographic maps and SMS have an important role in increasing the accountability of the public administration. Accountability is connected to the ability to respond and to clearly report the activities carried out. As an aspect of governance, this responsibility has been in the past and must be now and in the future a main topic of discussions when concerning about issues related to the public, non-profit and private sectors.

In addition to the papers hereinafter reported, other contributors to the Panel have been:

- Jean-Claude Bolay, Abigail Kern Centre Coopération & Développement, Ecole Polytechnique Fédérale de Lausanne: *"Technology and urban planning: What is appropriate for cities of the South?"*

  The communication dealt with technologies, considered as catalysts for change, and their links to urban development. One of the main questions to be investigated for the next decades, in relation with the spatial and demographic growth of cities in Southern countries, is to know if we could discern appropriate technologies adapted to the specific urban contexts, affordable for users, socially acceptable, and efficient in order to improve concretely the present and future situation tackled by urban population, stakeholders and authorities. Particularly for developing and emerging countries, technological breakthroughs create wonderful opportunities but they may also convey risks that should not be overlooked. This leads to crucial questions on the nature of technological innovation and its capacity to fulfill the specific needs of these societies, characterized, in a lot of cities in Africa, Asia and Latin America, by limited financial and human resources. In a prospective approach, we shall try to identify priority sectors fostering a sustainable urban development, 4 at the initial moment of our research process: habitat; energies; water and sanitation; transport.
  The aim of the contribution is: addressing the question of the existence of exclusively-urban technologies; exploring the framework conditions allowing the implementation of appropriate technologies in Southern cities; assessing the criteria allowing an access for all inhabitants to urban infrastructures and services; defining key elements we shall have to find in instruments used to translate the urban information in real applicable tools of urban planning, with a focus on "poor cities".

- Elisabetta Demartis, Università degli Studi di Torino: *"Geographies for peace and development cooperation. Mapping and preventing violence and post-electoral disorders in Nairobi slums: an ICT4D participative project"*.

  The general purpose of the paper is to reflect on how ICTs can improve the social issues of Developing Counties. The research starts from a participative project in three slums of Nairobi (Kibera, Mathare and Mukuru), where Map Kibera Trust set up a Ushahidi crowdmap platform to monitor the elections and prevent post-election violences and disorders. The methodology and approach used are a combination of semi structured questionnaire addressed to Map Kibera members, interviews of Kibera CBOs and Ngos, focus groups coupled with the author's previous research on ICT4D.
  The research aims to discover the driving forces behind the project and its impact on the community, first of all on people living in Kibera. In detail:
  - What is the background of the members of the Map Kibera and how they are integrated within the territory of the slum;

- How can a participatory mapping project to prevent riots and post-election violence;
- How many people were really involved in the project and how;
- Can this project be considered a success which confirms the positive role of ICT in emergency cases such as elections;
- How the project may involve slum dwellers and influence them positively.
- The implications are significant in light of the ICT4D scenario and research, aiming at understanding how a technology can be used at its best to impact positively on a social issue. At the core of this idea is the belief that behind the crowdmap there is not just the software that allows the creation, but that set of social, spatial and human values that connect people with their own territory, in this case with one of the largest slums in Africa.

- Christian Quintili, Luca Fanelli, ActionAid Italia: *"Open Ricostruzione"*.

Open Ricostruzione is an Italian program which aims to guarantee a transparent reconstruction of Emilia Romagna, shocked by an earthquake in May 2012, through the use of digital technologies and the citizens collaboration. Open Ricostruzione is the result of an innovative cooperation between public institutions and civil society organizations: Emilia Romagna Region, ANCI, Anci Tel, Wikitalia Open Polis and ActionAid.

THE USE OF ICT FOR SOCIAL INCLUSION AND PARTECIPATIVE PLANNING. A CASE STUDY OF "SOUTH-NORTH" TECHNOLOGY TRANSFER.

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ABSTRACT

The proposed paper aims to address the use of ICT for social inclusion. In peculiar this research study and experimentation examine both the application of participative methods and techniques, which support the community to identify problems and resources, and the possibility to integrate data and tools with the ones used by public stakeholders, as a starting point for future interventions. Participative planning is then intended as a way to think over the public action, either in the relationship with citizens or in the public space management. The proposed subject takes cue from the "Crowdmapping Mirafiori Sud" project outcomes. The project has been granted with 5x1000 funds from Politecnico di Torino for student projects and is now in the final phase. The aim of the project is to conduct a pilot experience in a participative and inclusive way in order to identify and categorize – returning information on a geographic map – the nature, the location and consistency of the obstacles/barriers which prevent vulnerable categories to access and use the public spaces of their neighbourhood. For this aim it is going to be used Ushahidi, an opensource platform which allows an easy crowdsourcing of data and the total transparency of their diffusion. One of the key aspect of using Ushahidi is the possibility to use mobile phones as a mean to send reports and receive updates, not needing an internet connection, which is often not available. Outcomes of data collection are then available and given to local and public actors, establishing a direct connection with the instrument used and the possibility to continue the project autonomously. This crowdmapping, and the transparency of the process, are useful not only to sensitize the population and to define the state of the art, but they mostly allow to interpret the results, analyzing the problem from the point of view of the community, the public actors and the scientists, hypothesizing active and participative solutions.

BACKGROUND

Increasingly over the last decade, there has been attention and expectations on the role that ICT based technology platforms such as websites and wikis, social media, interactive geo-mapping, and SMS and voice based reporting can play in increasing *accountability*, participation and transparency in the Public Administration (R. Avila et al. 2010; W. Reyes 2006).

Concerning ICT and social innovation rich are also the literature and the scientific debate, however the practical side is still under exploration and it need to be developed through projects and initiatives which effectively foresee participation and interaction of the involved actors.

Some exceptions are worth mentioning, among others: FixMyStreet in Uk, a platform where people can send information and discuss local problems about infrastructural issues or ePart and IRIS Beta in Italy. Their common goal is to offer an online service which allows citizens to interact with the public administration and to send information. They have a transparent interface and they are easy to use, they mainly allow to see the warning list and to check the status.

This paper aims to examine both the application of participative methods and techniques, which support the community to identify problems and resources, and the possibility to integrate data and tools with the ones used by public actors, as a starting point for future interventions. Participative planning is then intended as a way to think over the public action, either in the relationship with citizens or in the public space management.

THE CROWDMAPPING MIRAFIORI SUD PROJECT

The proposed subject takes cue from the "Crowdmapping Mirafiori Sud" project outcomes. The project has been granted with 5x1000 funds from Politecnico di Torino for student projects and is now in the final phase.

The project "Crowdmapping Mirafiori Sud" (www.polito.it/mapmirafiorisud) has been conceived and drafted under the lead of the Research and Documentation Center in Technology, Architecture and City in Developing and

Emerging Countries (CRD-PVS) at the Politecnico di Torino.

It is set in continuity with the ongoing research of the CRD-PVS, which seek to experiment the applicability of strategies, methods and instruments successfully developed in the Global South into urban contexts of traditionally defined "developed" Countries and nowadays in deep transformation or crisis.

As a recent experience the CRD-PVS organized in collaboration with UN-Habitat the international student design competition *Tur(i)ntogreen – farms in a town* (www.polito.it/turintogreen), with the aim of reflecting on the urban future. The Competition area was the Mirafiori Sud neighbourhood in Torino (Italy). This neighbourhood has been the emblem of the italian motown during the economic boom, gradually decreased due to the work crisis and to the new production geographies; it will be in the next future the object of urban transformations with an high social and economic potential.

Furthermore Mirafiori Sud is an active neighbourhood, with dwellers keen to participate into the urban transformation projects, in order to overtake the actual situation of crisis and poverty. A rich and lively network of local associations support them in this sense.

Thanks to the tur(i)ntogreen competition, the CRD-PVS had the opportunity to get in contact and collaborate with some of the local actors and stakeholders such as the Fondazione della Comunità di Mirafiori Onlus and the City Council District.

The aim of the project Crowdmapping Mirafiori Sud is to conduct a pilot experience in a participative and inclusive way (together with the population and the local associations) in order to identify and categorize – returning information on a geographic map – the nature, the location and consistency of the obstacles/barriers which prevent vulnerable categories to access and use the public spaces of their neighbourhood.

For this aim it is going to be used Ushahidi, developed in Kenya to map in 2008 the violence in the post-electoral period, an opensource platform which allows an easy crowdsourcing of data and the total transparency of their diffusion (Hagen E. 2011). Ushahidi is nowadays used as a prototype and an example of something that could be done by matching information generated from citizens reports, media and NGOs into a geographical map.

One of the key aspect of utilizing Ushahidi is the possibility to use of mobile phones as a mean to send reports and receive updates, not needing an internet connection, which is often not available.

The project is addressed to citizens, dwellers of Mirafiori Sud neighbourhood, in particular to those who belong to the most vulnerable categories concerning accessibility and use of urban public spaces.

The problems identification, survey and mapping will be lead by the proponent group together with citizens representatives, identified thanks to the contribution of Fondazione della Comunità di Mirafiori Onlus.

Outcomes of data collection will then be available and given to local and public actors, estabilishing a direct connection with the instrument used and the possibility to continue the project autonomously.

This crowdmapping, and the transparency of the process, will be useful not only to sensitize the population and to define the state of the art, but they will mostly allow to interpret the results, analyzing the problem from the point of view of the community, the public actors and the scientists, hypothesizing active and participative solutions.

Because of this reasons, the project is meant to be a pilot project, relevant for other neighbourhoods and other cities, either at a national or international level.

METODOLOGY AND TOOLS

The project has been developed from April to October 2013, through the following phases:

- **Kick off.** A necessary phase of identification, contact and meeting with the local actors and representative of the categories identified as "vulnerable". After the launch the students group planned meetings with both civil society's representatives and public administrators in order to better explain the projects, advertise it and gather consensus to form a group which would have then make the first signals.


Fig. 1, 2 - Kick-off Meetings.

- **Definition of Criteria.** Starting from the interaction with local actors through a series of transect walks, and ending with a reflection on criteria, categories, standard identification of the phenomena to be signaled, for a coherent achievement of a data base. The formed group took some transect-walks along the neighbourhood in order to better understand the area, let the involved people discuss and transmit their knowledge and finally start looking for obstacles. The willing to involve people since the first steps is innate in the nature of the project, which doesn't want to have fixed prejudiced but it would like to look at the real obstacles for whoever lives the neighbourhood, either them being physical, mental, intellectual or visual.
- **Set up. S**tarting from inputs acquisition from the local actors. Setting of the Ushahidi platform for a better response to the project's goals.
  In order to better improve the system and to create an useful instrument, the students designed a website where all information and news can be found. An email address, a telephone and an SMS numbers were also established, in this manner civil society and public administration had all the means to get in contact and to send their posts.
  As long as the aim of the project is to create and to use an instrument which has to be affordable, appropriate and easy to use, the team decided to implement the use of SMS to send information, which could be done by any mobile phone, both basic ones and smartphones.
  The iXem Labs, a component of the Department of Electronics and Telecommunications of the Politecnico di Torino, which field of activity is mainly related to wireless systems and networks, radioplanning, radiofrequency propagation and high frequency electromagnetic compatibility, created a system which could send SMS direct to an email address. The system is based on the Arduino, a low cost open-hardware platform with the addition of a GSM\3G shield. The platform is connected to Internet by means of Ethernet connection. It may be also possible to set up a 3G connection in case of absence of Ethernet connectivity.
  Once an SMS has been received, the program performs two automatic actions, it forwards the information to the Maps platform and sends an alert via e-mail to the administrators. Afterwards the Platform takes in charge the information received from the Arduino and with an automatic procedure it publishes the reporting on the Map. The new message is not public yet waiting for the approval by the administrators. In order to improve the reliability of the system, the Arduino platform logs all the data and actions on a local SD such that even in case of failure of connectivity it is possible to recover all data locally.
  Furthermore it is possible to query the SIM card, by means of special string sent via SMS, in order to retrieve information about: status of SMS storage capacity, ask to re-send a particular SMS, delete all SMS, automatic reply, etcetera (De Filippi F., Pantanetti S., Stefanelli R., 2014).


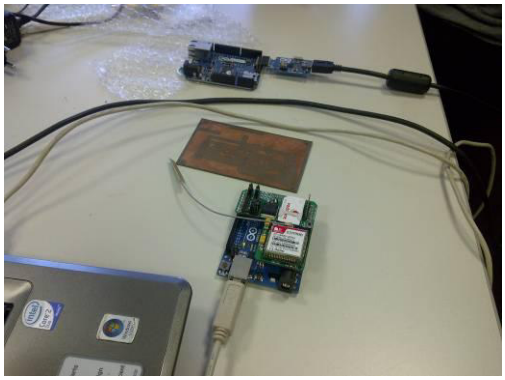

Fig. 3, 4 - The Arduino-based system set up by iXemLabs (Politecnico di Torino).

- **Training.** With the support of the Fondazione della Comunità di Mirafiori, a group of inhabitants [30] is selected for collecting data on the area, stimulating the effect of crowdmapping. A period of training is conceived in order to understand how the platform works and how to send information by the means of SMS, emails, phone calls and website.
- **On field data collection.** The data collection begins through a direct analysis, with the representatives of the interested categories, and an indirect analysis based on the received inputs on Ushahidi. During June and July 2013 the group formed by the students and the involved citizens made different data collections in the neighbourhood, sending information direct from mobile phones, app and computers to the Crowdmapping Mirafiori Sud Website, email and numbers. Once the information is received, it must be approved by a member of the student team and then it can be seen in the map.
  In the meanwhile an analysis of data is needed, in order to understand the weak points and to discuss with people This analysis is made by all the involved people using more traditional ways such as meetings. From this meetings other important information are gathered which could be seen on both the map and the website. This process is important to enhance participation: people are directly involved from the first to the last steps.

Fig. 5, 6 - Data collection.

- **On line**. Once the data collection is completed, the elaboration and dissemination phase will take place through preparation and distribution of the material (reports, videos, photos, etc...) to all the stakeholders involved in the project. All tools and materials can be used by the local actors, to continue the project in an autonomous way, eventually supported by the team in future interventions.

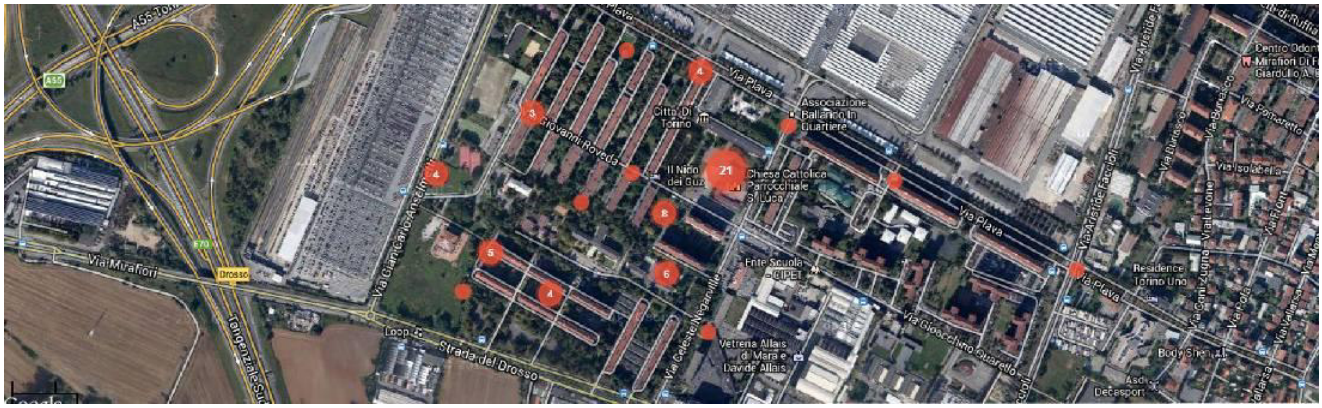

Fig. 4 - The Project Map.

CONCLUSIONS

The project outcomes are:

- having created a “smart” methodology and tool, based on the use of ICT (internet and mobile phones) to map the barriers and enhance the community participation and social inclusion; its use is not limited to identify and point out single interventions, but also to analyze phenomena at the urban scale;
- having built local capacities, stimulate participation and ownership;
- having enabled Local Authorities to access and use the data, to build and strengthen their "accountability";
- having set up a pilot scheme that could be replicated and expanded to other neighborhoods (or to other contexts).

ACKNOWLEDGEMENTS

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AN EFFECTIVE STRATEGY TO DEVELOP EFFICIENT SERVICES FOR A DIGITAL-DIVIDED POPULATION

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ABSTRACT

The project consists of a medium scale Internet of Things and Internet of Services experiment, in a rural village in the Italian Countryside, where population is relatively aged and the village is almost digitally divided from the neighboring cities (and consequently from the whole World). A wide band wireless network with full coverage has been built, to provide several remote services: Internet access, intelligent house (garden) control, remote assistance to people. Internet of Things and Internet of Services activities are realized by means of low cost, open technology. A relevant application is represented by tele-assistance to elder people living alone. The results obtained during the first eighteen months of experimentation demonstrate a strong participation of the local population, a reduction of the house management costs, together with an increase of safety and security, which are particularly critical in rural scenarios, far from the accessibility levels typically found in metropolitan city.

INTRODUCTION

The digital gap in rural (remote) regions is considered a strategic issue for Developing, but also Developed Countries, a clear limitation of living conditions, and one of the most significant causes of emigration, loss of popular heritage and traditions. The connection to the digital World represents the most significant way to provide access to information and cultural exchange, but also to basic social services like telemedicine and distance learning. Additionally, in the very last years, a digital channel is more and more requested to transport information related to Things and Services.

In rural scenarios, the possibility to acquire, share and control information associated to house and/or environment may signify not only additional comfort, but also energy saving, costs reduction, improved life quality, advanced security, health assistance. Nonetheless, transforming a rural living place into an intelligent one does not make real sense, without a network. When a network is available, Things and Services may be inserted in a virtual social network, as the Humans do. The inhabitants may share, compare, and optimize house managing. Or, even more, they could delegate management to somebody else. Security control can be assigned to an external authority. Energy consumption can be administered at a Municipality level. Health assistance can be supervised by a medical unit.

Bringing a networked intelligent platform to rural places is normally limited by bandwidth availability and end-users technological skill. Network operators have no significant advantage to operate in the Countryside, because of the restricted number of possible subscribers. Furthermore, rural citizens are typically unfamiliar with high technology and intelligent systems.

Starting from these basic concepts, we have developed an implementation scheme to facilitate adoption of intelligent systems in the Countryside. It is based on the realization of a very low cost, wideband last-mile Intranet network, on the construction of extremely low cost sensors and controllers, on a strong participation of the inhabitants, on the enrolment of University students during the design, realization and technological transfer phases. The scheme is being successfully implemented in a peculiar location in the Italian Countryside.

THE LOCATION

The experiment has been organized and developed in the Municipality of Verrua Savoia, in the Monferrato region, a huge hilly, mainly agricultural area in North-Western Italy, not far from the city of Torino. The village covers a territory of about 16 square kilometers, where about 1400 inhabitants live, with half of the population aging more than sixty-five years old. Very few factories and commercial activities are present; the economy is mainly agricultural, for ninety percent devoted to family needs. Most of the people aging between 15 and 60 are commuters and travel far from the village, staying outside for a large part of the day. Topographically, the Municipality area is formed by more than thirty islets, some of them being connected exclusively through dirty roads.

As a business case, for ICT companies, the Municipality is a losing affair: for long times, no wideband connectivity has been provided to the inhabitants and still now, several hamlets are not provided with cabled ADSL connectivity.

The relative distance from the city, the average age of the population, the significant presence of commuters and the lack of ICT facilities and ICT know-how make the selected location a representative case of a general remote rural context.

THE EXPERIMENT

To set-up any kind of network study, the first step is represented by bandwidth availability and end-user connectability. To bridge this initial gap, at first, a Municipality wireless network has been realized, in order to interconnect all the hamlets of the village [1] [2]. Figure 1 shows the orographic profile of Verrua Savoia and the position of the Hyperlan base stations. To lower the costs and avoid expenses, network design the construction of hardware components have been developed by a first group of University students, during their courses or internships [3] [4]. Citizens have participated to the network realization, installing autonomously client equipments for connecting to the network. Additionally, Internet connectivity has been provided for free to all subscribers, transporting bandwidth from an Internet exchange to the village by means of a high performance point–to-point radio-link.

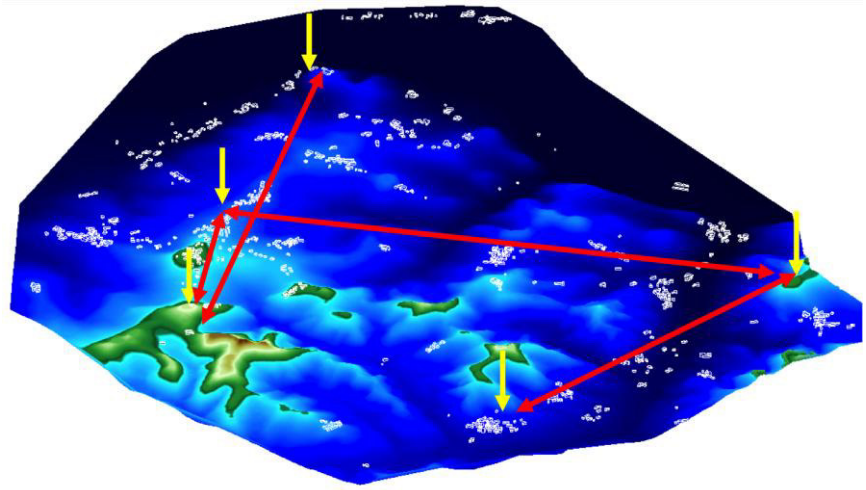

Fig. 1 - Orographic representation of Verrua Savoia: yellow arrows indicate the Hyperlan Access Points, red arrows show backbone links and white boxes are houses.

Once this first phase has been completed, we have started developing home automation facilities for each subscriber. Citizens have been provided with one controller that can be connected to several sensors, a large number of personal Ethernet devices, and actuators. The controller, the sensors and the actuators have been built by means of extremely-low-cost devices, developed on purpose for larger scale applications in rural environments [5]. These open hardware solutions have been designed and realized by a second group of University students (Figure 2). Among the several parameters that can be monitored are: temperature and humidity of the relevant rooms, unexpected gas/water leakages in the living environments, mechanical and vibrational state of buildings, ground humidity. The list of Ethernet devices comprises cameras, loudspeakers, light detectors, etc. As actuators, the controller is able to manage thermostats, fuel burners, stoves, automated wells, alarming units and again any kind of Ethernet based actuator.

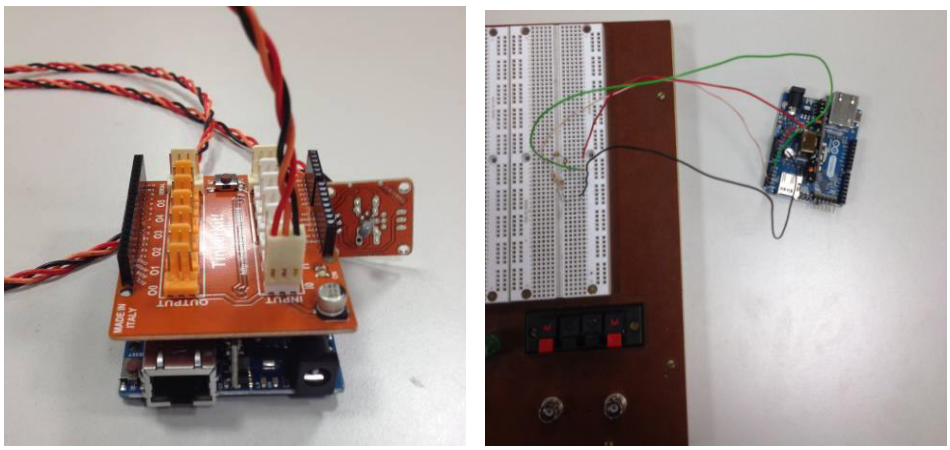

Fig. 2 - Examples of prototypes manufactured in our Lab, ready for installation in the house selected for the preliminary application of the experiment

In the same time, a customized network environment, together with a dedicated web platform, has been developed, to favor an easy and integrated management of the sensing and controlling components. The collected information is transferred to a general monitoring console, hosted in the Municipality building, which offers a global overview of the situation of the whole village, and allows an upper and immediate level of protection and intervention. Its functionality can be undertaken by the owner or delegated to the Municipality console, depending on the presence/absence/capability of the house holder himself.

Moreover, we are developing a dedicated infrastructure to provide remote control of the living conditions of elder people, without affecting their privacy. The system is realized thanks to an extremely low cost wireless passive tracking platform, which detects information about the activity inside the house. A dedicated algorithm processes the acquired information, thanks to statistical comparisons and cross-correlation computations originated from data acquired during certain amounts of periods. This solution does not require any action by the inhabitant, neither wearing a device, nor being confident with technology: hence it can be exploited to a very general case.

RESULTS AND OUTCOMES

The network has been constructed between August and October 2010 and the number of subscribers has been increasing continuously, becoming approximately 240 in September 2013 (over a total of about 600 families). The participants distribution on the territory of the Municipality of Verrua Savoia is shown in Figure 3. Figure 4 shows temporal evolution of the subscribers from August 2010 to September 2013. Surprisingly (but not very much), not only young people were interested to the new technology: in fact, the Municipality was forced to change the teaching program of the local Third Age University, inserting (between a cooking lecture and a gardening one) a dedicated Introduction to ICTs. User appreciation about the network is very high. Even if network management is carried out by University students and there is not a structured "customer service", citizens participate actively to network control, being always the first to document network problems and sometimes providing suggestions. During last winter, when a huge snowfall covered the solar panels compromising power supply of half the network backbone, 10 volunteers offered to climb up the hills and put into service the infrastructure.

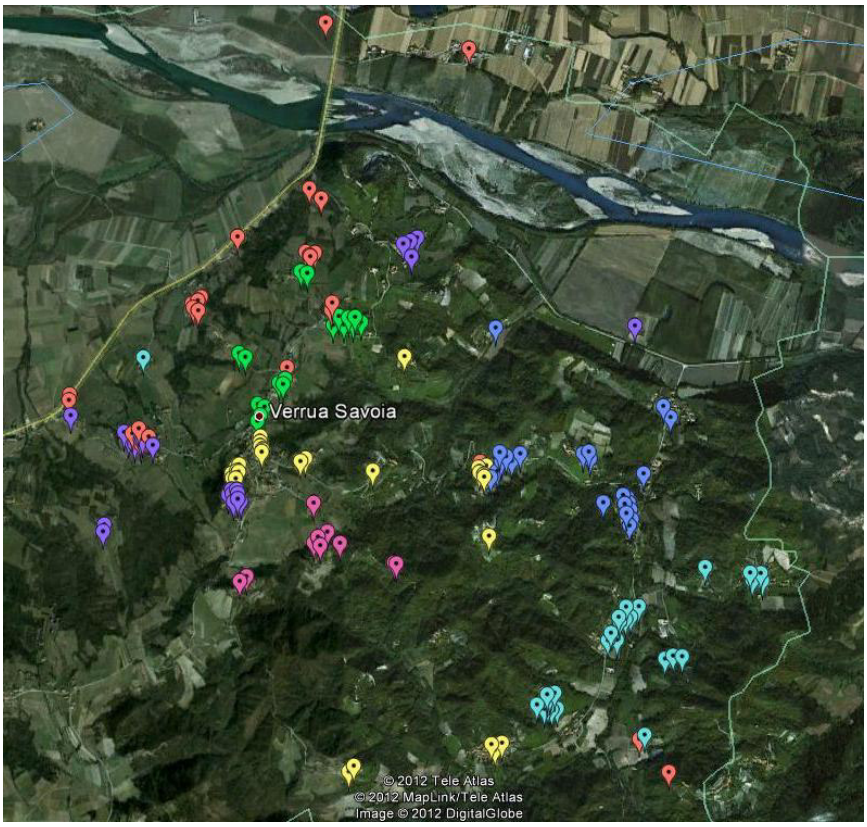

Fig. 1 - Participants distribution in the territory of Verrua Savoia.

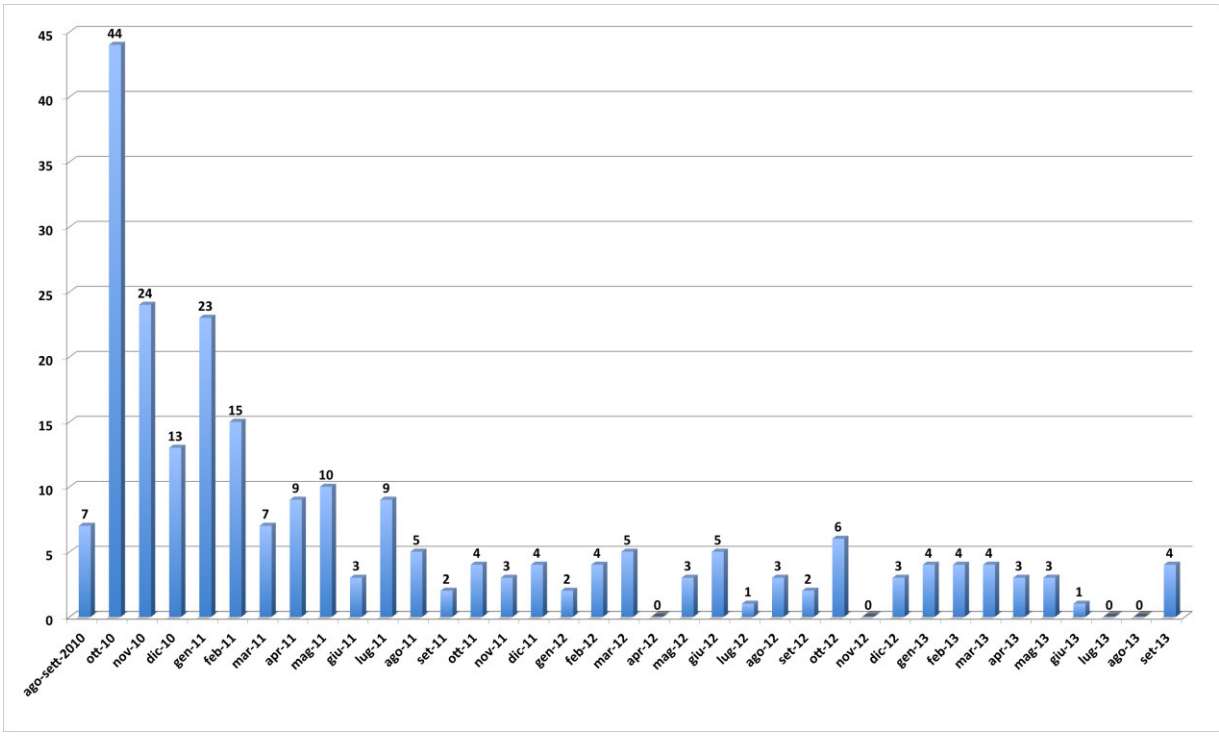

Fig. 2 - Temporal evolution of the number of participants from August 2010 to September 2013.

The preliminary results measured in the house that has been automated since the beginning of winter 2010-2011 are showing dramatic money savings, primarily due to the remote control of the sensing equipment. They exhibit a reduction of almost the 50% of the heating energy consumption and about 25% of garden watering. As a matter of fact, this early result could not be considered as representative of the functionality of the whole system, but it represents an interesting starting point that generates important perspectives for the continuation and implementation of the project on a larger scale. Figure 5 shows one of the temperature sensors mounted on the wall of the bedroom, while Figure 6 presents a wood stove connected to the controller.

Fig. 3 - Temperature sensor mounted on wall bedroom.

Fig. 4 - Wood stove connected to the controller.

Data regarding the following winter season (2011-2012) are more representative, as they are been applied to a larger number of houses. Unfortunately, they are affected by an unpredictable trigger: winter 2011-2012 has been the coldest of the last 100 years in Europe. Nevertheless, we have still measured an average reduction of the 10% of the expenditures, between early November and late February. This datum should be analyzed and disaggregated, or, even more, compared to further data acquire in the next winter periods.

On October 28, 2011, the inhabitants have been involved in a photographic competition with subject related to their own home equipment installation. The competition has gathered a large number of participants (http://www.ixem.polito.it/research/Verrua_2010/Concorso_fotografico_2011_e.htm): one more demonstration of the passion generated by the project.

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