W@: Athens Smart City

Inputs for a roadmap towards Smart Community in Athens @Panormou

1. ABSTRACT

Background on EU level

Not least since the "Smart Cities" European Industrial Initiative (EII) within the framework of the European Commission's Strategic Energy Technology (SET)-Plan and the implementation of the SmartCities-Workgroup within the European Energy Research Alliance (EERA) at the end of January 2011, chaired by the AIT, the topic 'Smart Cities' has reached a European dimension.

Smart Cities - what are they?

The term 'Smart Cities' is used by persons with very different professional backgrounds. Due to the wide variety of topics in the field of Smart Cities it is very difficult to clearly define the future strategies in these areas. Based on a definition of the term and focusing on energy relevant aspects this workshop will provide an overview of current research topics related to Smart Cities, will present the current state of the City of Athens research and approaches proposed by different scientific disciplines as well as focus on the very broad and complex research field Smart Cities. These topics will be discussed at the workshop:

1. Smart & Sustainable living
2. Smart & Sustainable working
3. Smart & Sustainable mobility
4. Smart & Sustainable public space

Smart Cities Workshop at the ECOWEEK conference

The workshop will be held within the framework of the ECOWEEK and will be chaired by eyennovation, which will first present the state and actors of the City of Athens research on Smart Cities. The major part of the workshop will be devoted to moderated discussions concerning the state of the art and future focuses of research on Smart Cities which will include the contribution and idea of the project @Panormou, suggested City of Athens' site for ECOWEEK. The results of the workshop will be used to elaborate roadmaps and action plans for political stakeholders and further access EU calls for proposal for its implementation.

2. MOTIVATION

Research on Smart Cities - the Athens Smart City @Panormou project

To date, research in the field of Smart Cities has been carried out mainly in different research institutes with different scientific focuses and the exchange of knowledge was restricted to scientific conferences. Furthermore, there has been no overview of which actors are dealing with which topics and problems in the field of Smart Cities. This project brings together the City of Athens Smart Citiy actors for the first time. Within the Athens Smart City @Panormou project eyennovation is elaborating recommendations for a consolidated and focused research in Athens within the field of Smart Cities for political stakeholders and "end-users" shareholders.

Background Athens Smart City @Panormou

Athens Smart City @Panormou would like to be a unique cooperation between the citizens of Athens, businesses and Authorities in order to illustrate how energy can be saved, now and in the future, throughout the usage of ICT and how to address a societal challenge change throughout the IoT (Internet of Things). We aim at jointly developing a "Smart Community" site that will change the City of Athens, but we test them first on simulation within the future @Panormou "Smart Community" in Athens. The project under the umbrella of the SG4SG Council, aims at initiating engagement at the ECOWEEK 2011 in Athens from the 12th to the 18th of December 2011, as a workshop and Project-Partners Presentation. After then it will aim at increasing rapidly new partners to join, based on a PPP structure. Athens Smart City focuses on innovative technology, sustainable economic investments and changing the behavior of the people in Athens, by delivering a prototype testbed @Panormou. Our partners and small-scale local projects will allow us to test these initiatives the best practices of these projects will be implemented on @Panormou testbed, allowing us to create a catalyst for climate and energy programs. The ultimate goal of these projects is the reduction of CO_2 emissions on an Athens, national and European scale. Over the next 5 years a large number of projects will be implemented in the workshop focus areas Working, Living, Mobility and Public Space. The first three areas are each responsible for approximately one third of the total CO_2 emissions of the city. The municipality of Athens itself will also reduce its energy use and adopt modern energy saving technologies where possible. All knowledge and experience that is gained during the test-bed project will be shared with other communities in Athens, in other cities, nationally and internationally. Athens Smart City @Panormou will become more and more visible during the coming years. The founders invite you to have a look at the various initiatives in Athens @Panormou testbed site.

The aims of the project:

I. Definition of the scope of "Athens Smart City @Panormou": What is it? – Survey on the state of research in the field of Smart Cities in Athens with consideration of international activities
II. Constitution of a network of Smart Cities-actors from research, industry and politics (in the framework of different workshops parallel to ECOWEEK) and elaboration of a competence matrix
III. Evaluation and assessment of future implementation of the topics as well as elaboration of a proposal to deliver to EU FP7 Calls related to Intelligent Spaces

3. APPROACH

Athens Smart City @Panormou deals with the approaches of 4 areas as well as a focusing of the very wide and complex research field IoT. The elaboration of implementation for the @Panormou Athens' Community of the future is carried out in several steps:

a) State-of-the-art-research: literature review of Athens Smart City @Panormou demonstration project categorization of research topics, definition and implementation of scope of Athens Smart City @Panormou during the workshop at ECOWEEK framework
b) Identification of actors in research on Athens Smart City @Panormou and interviews with selected actors; elaboration of a competence matrix; Preparatory workshops with actors, stakeholders and shareholders
c) Validation of results with stakeholders in different workshops and a round table with shareholders for finalizing the data and output of the workshop at ECOWEEK
d) Deduction of future implementation of the topics from the first preparatory workshop; discussion of these topics in different workshops
e) Elaboration of action plan for and discussion with political stakeholders for kick-off of working-site
f) Presentation of the @Panormou project final Sustainable Viability and Operation Plan at the W@ "workshop" at ECOWEEK 2011 Athens
g) Presentation of the Proposal to the EU calls for proposal in the field of "Smart City"

Factsheet Sustainable Living outline @Panormou

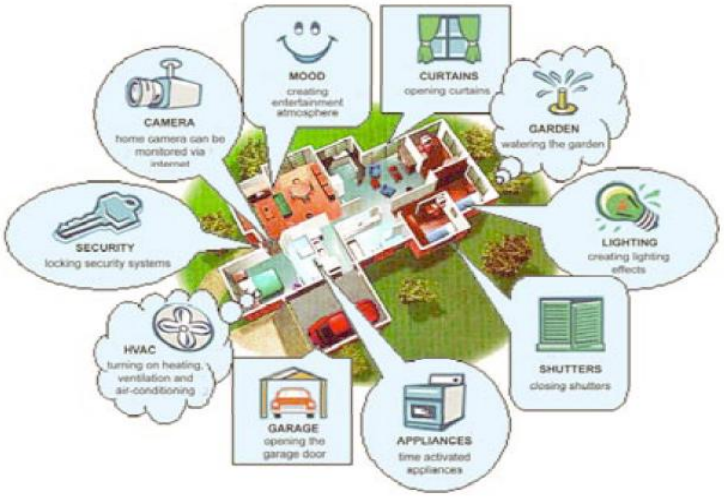
Households represent approximately 33% of the entire CO_2 emissions of the city of Athens. Sustainable Living focuses on households and sustainable housing. The project goals of Sustainable Living are the reduction of CO_2 emissions and energy use in Athens. These goals are realized by applying sustainable and energy saving technology in combination with the stimulation of behavioral change of the energy user. All Athens Smart City projects are executed in such a way that the gained knowledge and experience are of use for a large scale implementation in Athens and other cities in Greece and abroad.

There are already examples of smart houses being demonstrated and the future intelligent home will build on these experiences. The present experience is tailor made, and each thing in the house has been carefully selected and tuned to interoperate with all the other intelligent devices. This is too costly for most houses and the intelligent home remains a dream for most people. The big paradigm shift comes when every smart object knows the interoperable protocols removing the need for the dedicated systems developed independently today. For instance, there are several solutions for intelligently controlling every power socket in the house thus allowing simple tasks like switching on and off lights, and more complex ones such as fine-grained management of electrical heaters, in order to set the ambient temperature. However, the control systems in operation today are quite basic and apply only to the wall socket, and cannot manage appliances connected through extension cords. In the future Internet of Things the lamps or even the light bulbs will be addressable and intelligent, and a global house management controller will be able to control every single smart device.

Maintaining a comfort temperature and heating of water are the most energy consuming tasks of the house with huge potentials for energy conservation, and as a consequence a significant positive impact on the environment.

There will be robots taking care of the house, performing routine works such as cleaning or maintenance. These will collaborate autonomously with the house sensors, and the house control. The intelligent appliances will collaborate to conserve energy, and to signal need for new supplies of food, detergents, maintenance, etc. Some of which may be satisfied automatically by the maintenance robot. This will take away some of today's tedious housekeeping activities.

The house will also jointly try to maximize the comfort of each of its inhabitants by learning the individual preference profiles. The coffee will be ready at the right time in the morning, surround sound system will broadcast and adapt to the right media (television, phone, radio, CD10, DVD11, or computer), and record the stream if the user is unavailable, the bathtub will be filled with water at the right temperature. Similarly, mobile robots and wireless smart devices will be able to seamlessly interact and communicate with the environment, thereby contributing to the efficient, secure and inclusive nature of the European societies. Elderly and people with disabilities will find the house capable of taking charge of activities that today may require excessive effort or manual assistance.



Factsheet Sustainable Working @Panormou

Companies – ranging from small shop to multinational – represent approximately 33% of the entire CO_2 emissions of the city of Athens. Sustainable Working focuses on sustainable real estate and processes of companies. The project goals of Sustainable Working are the reduction of CO_2 emissions and energy use in Athens. These goals are realized by applying sustainable and energy saving technology in combination with the stimulation of behavioral change of the energy user. All Athens Smart City projects are executed in such a way that the gained knowledge and experience are of use for a large scale implementation in Athens and other cities in Greece and abroad.

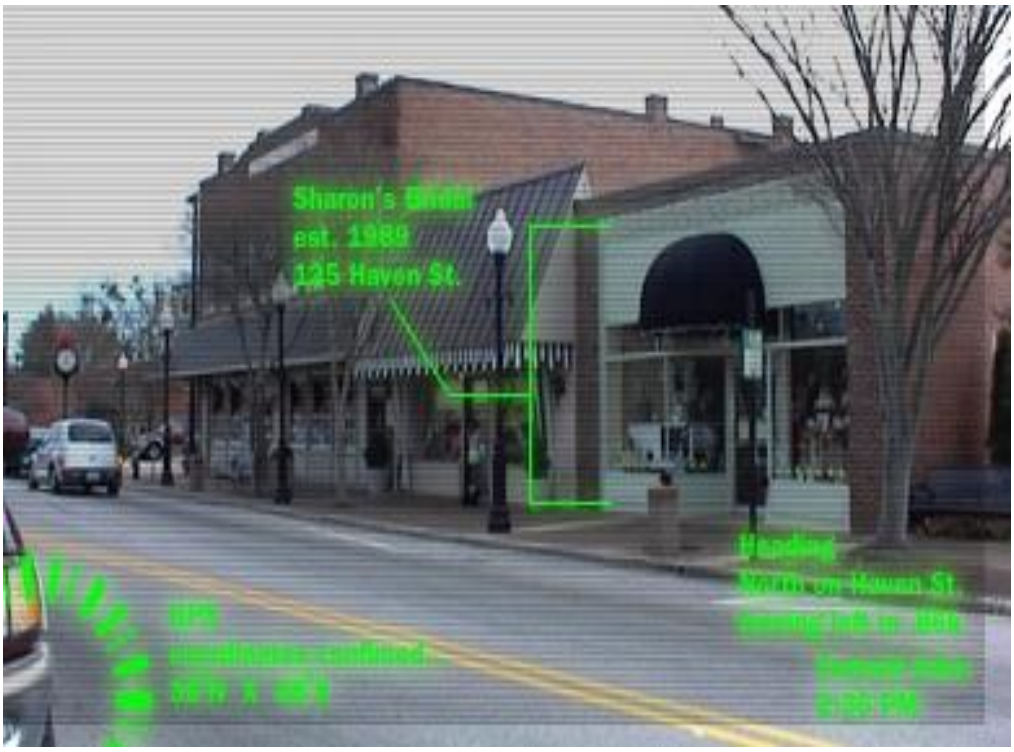
The idea behind a smart office is very similar to that of the smart home, the main difference being the goals that one has at the office compared to being at home. Smart offices can try to make its workers more efficient by making tasks easier to perform. It should also make it easier for items to be kept secure. Akyol, Fredette, Jakson, Krishnan, Mankins, Partridge, Shectman, and Troxel (1999) describe possible problems that a smart office can solve and also how the infrastructure can be protected.
Smart offices should also help by making resources available to its workers. For example, remote workers should have access to infrastructure in the office (like printers and projectors) when they are on the road. Possible ways of constructing these environments and their security implications are presented by Kagal, Finin, and Joshi (2001). Another difference is the amount of control that a user has over the environment. In a smart home, a person can be a master of the area. The ways things work are in the best interests of the owner and the house's residents. In the office, policies are created and enforced with the interests of the organization taking priority. With the similarity between a smart office and a smart home, it is easy to imagine that some of the same devices would exist in both locations. These devices may have differences depending on their location. For example, at home, a device has one set of capabilities. When arriving at work, the device gets a different set. This can also be used to transfer preferences and other information about the user allowing things to be adjusted for the user upon entering a new location. Bagci, Schick, Petzold, Trumler, and Ungerer (2005) present a prototype of how location can be used for users to find their way around the office and inform a user about new email from a specific sender.

Factsheet Sustainable Mobility @Panormou

Mobility – ranging from scooter to cruise ship – represents approximately 33% of the entire CO_2 emissions of the city of Athens. Sustainable Mobility focuses on sustainable means of Mobility and the required infrastructure. The project goals of Sustainable Mobility are the reduction of CO_2 emissions and energy use in Athens. These goals are realized by applying sustainable and energy saving technology in combination with the stimulation of behavioural change of the energy user. All Athens Smart City projects are executed in such a way that the gained knowledge and experience are of use for a large scale implementation in Athens and other cities in Greece and abroad.

In modern cars a stunning 30% of the total cost is electronic components. These systems are the base of the much increased safety for the drivers and the environment. Despite a sharp increase in road traffic since 1970 and an increase in the number of car accidents, there has been a constant decrease of injuries and deaths thanks to the new systems introduced in cars like anti-blocking breaks and traction control. However, all of this has been achieved considering the car as an independent system. This trend will be further amplified when the cars will be able to communicate and autonomously start gathering ambient information. For instance when there is a queue, the first cars may tell the cars behind if there is an accident or just too much traffic, and this will eventually make intelligent navigation systems re-plan the route of cars programmed to go down already saturated roads. The cars may help the driver to keep safe distance to the car in front, and may refuse dangerous actions like speeding if the weather conditions are unsafe or overtaking if the oncoming car goes too fast. The cars can go by autopilot on highways reducing the risk of

fatigue related accidents. Cars will also be able to maintain themselves, calling for the appropriate service based on the self diagnosis of the problem and ensuring that the right replacement parts are in stock. The car will plan the time of service according to the diaries and preferences of the usual drives to minimize the petulancies of their lives, and make sure that there is a substitute car available if there would be a need for it. The cars will also be able to manage better the energy needed, by harvesting it in much higher quantities, by storing it with novel storage techniques, and by producing it more efficiently thanks to engines based fully or partly on new sources of energy. Optimal route planning will reduce the number of kilometers driven, and better control systems for the car will make the ride more energy efficient. All of these individual factors will contribute to reduced emissions and less pollution.The public transport sector may be radically changed when smart devices and travelers are identifiable. Ticketing based on RFID is already widely available: for instance 10 million daily travelers of the public transport system in Paris have already access to an electronic ticket12. One may easily envision that this system not only permit the user access to the stations, but that readers in the doors of the trains and busses enable an accurate tracking of every connection and route of every traveler. This will provide the operating company with perfect traffic data to optimize the network and service level, and to decide on the establishment of new lines. In the case of an emergency, the rescue workers could know the number of travelers in a certain station, and the name of the subscribers of the rechargeable ticket. The incentive for the user could be notifications in the case of operational problems or closed stations, with alternative routes and connections proposed.



Factsheet Sustainable Public Space @Panormou

The Municipality of Athens has set itself a challenging climate target: a climate neutral organization from 2015. From the perspective of this ambition, the Municipality can fulfill an example role for other public buildings, means of Mobility and objects in the public space. Sustainable Public Space focuses on sustainable schools, hospitals, libraries, street lighting, waste collection, etc. The project goals of Sustainable Public Space are the reduction of CO_2 emissions and energy use in Athens. These goals are realized by applying sustainable and energy saving technology in combination with the stimulation of behavioral change of the energy user. All Athens Smart City projects are executed in such a way that the gained knowledge and experience are of use for a large scale implementation in Athens and other cities in Greece and abroad.

Since ubiquitous computing systems need the ability to deduce users' intentions, preferences, and the state of the world automatically, they require the ability to perceive the physical world, interpret these observations, make inferences, and then take appropriate action. When these systems, capable of perception, cognition, and action, are embodied in a physical space, they are collectively known as Smart Environments, or Intelligent Environments (IEs).

To date, prototype IEs have been developed primarily for such spaces as conference rooms, classrooms, and ofces. The @Panormou Platform extends this notion by designing Smart Spaces specifically for informal public spaces, such as hallways, lounges, break rooms, and elevator lobbies. The ultimate vision of ubiquitous computing is that Smart Spaces will pervade all physical spaces, thereby enabling access to digital information anywhere and at any time.