TeMA

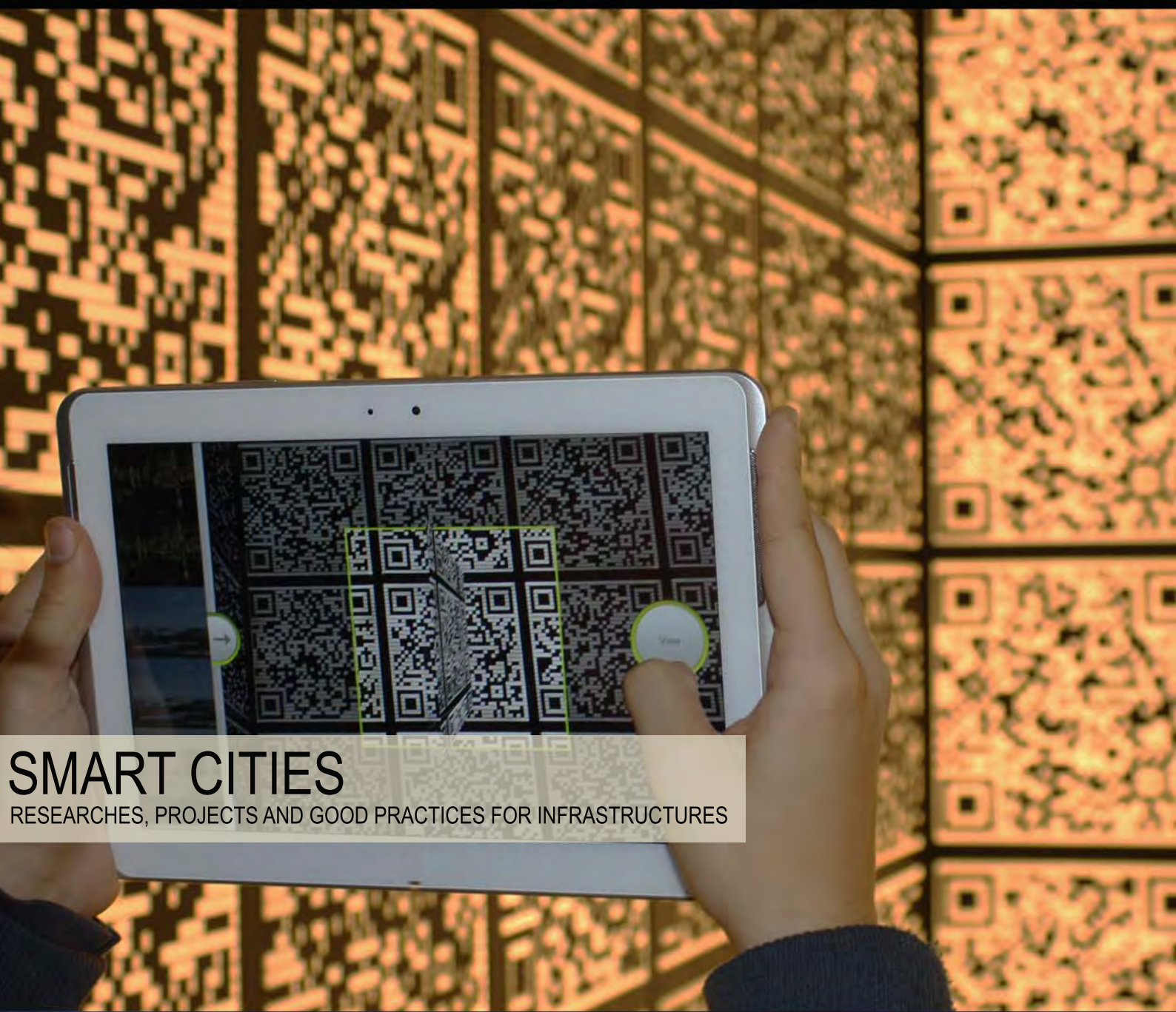## Journal of Land Use, Mobility and Environment

The concept of "Smart City", providing a the solution for making cities more efficient and sustainable has been quite popular in the policy field in recent years. In the contemporary debate, the concept of smart cities is related to the utilization of networked infrastructure to improve economic and political efficiency and enable social, cultural and urban development.

SMART CITIES
RESEARCHES, PROJECTS AND GOOD PRACTICES FOR INFRASTRUCTURES

TeMA

SMART CITIES:

RESEARCHES, PROJECTS AND GOOD PRACTICES FOR INFRASTRUCTURES

3 (2013)

TeMA

Journal of
Land Use, Mobility and Environment

TeMA - Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and Environment. Domains include: engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science, and complex systems.

The Italian *National Agency for the Evaluation of Universities and Research Institutes* (ANVUR) classified TeMA as one of the most highly regarded scholarly journals (Category A) in the Areas ICAR 05, ICAR 20 and ICAR21. TeMA Journal has also received the *Sparc Europe Seal* for Open Access Journals released by *Scholarly Publishing and Academic Resources Coalition* (SPARC Europe) and the *Directory of Open Access Journals* (DOAJ). TeMA publishes online under a Creative Commons Attribution 3.0 License and is blind peer reviewed at least by two referees selected among high-profile scientists. TeMA is a four-monthly journal. TeMA has been published since 2007 and is indexed in the main bibliographical databases and it is present in the catalogues of hundreds of academic and research libraries worldwide.

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The Reviews Pages keeps the readers up-to-date on developments in five reports: web, books, urban practices, law, news and events. Each report deals with the specific subject proposed in the TeMA issue. These reviews are specialist in nature but contain enough introductory material to make the main points intelligible to a non-specialist. The reader will not only be able to distinguish important developments and trends but will also find a sufficient number of references to the original literature, web and other resources .

01_WEB RESOURCES

The web report offers the readers web pages which are directly connected with the issue theme.

author: LAURA RUSSO
Tema Lab - Università degli Studi di Napoli Federico II, Italy
e-mail: laurarusso88@hotmail.it

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The books review suggests brand new publications related with the theme of the journal number.

author: FLORIANA ZUCARO
Tema Lab -Università degli Studi di Napoli Federico II, Italy
e-mail: floriana.zucaro@gmail.com

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VALENTINA PINTO
Tema Lab -Università degli Studi di Napoli Federico II, Italy
e-mail: valentina_pinto@hotmail.it

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Urban practices describes the most innovative application in practice of the journal theme.

author: GENNARO ANGIELLO
Tema Lab - Università degli Studi di Napoli Federico II, Italy
e-mail: gennaroangiello@yahoo.it

05_NEWS AND EVENTS

News and events section keeps the readers up-to-date on congresses, events and exhibition related to the journal theme.

author: GERARDO CARPENTIERI
Tema Lab- Università degli Studi di Napoli Federico II, Italy
e-mail: ger.carpentieri@gmail.com

01

SMART CITIES: RESEARCHES, PROJECTS AND GOOD PRACTICES FOR NETWORKS AND INFRASTRUCTURES

REVIEW PAGES: WEB RESOURCES

LAURA RUSSO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: laurarusso88@hotmail.it

In this number

NETWORKS AND INFRASTRUCTURE FOR SMART CITIES

Networks and infrastructure services are responsible for the level of livability of a smart city: utilities such as energy, water, mobility, and communications are fundamental services that make a city attractive and comfortable.

In terms of energy efficiency, smart city equals to smart grid. A smart grid is a sophisticated network of sensors that is able to reduce energy waste giving more control of energy consumption to users. Adopting and implementing smart grid technology allows cities to better manage the production and distribution of electricity, with a low environmental load.

Together with energy waste, water waste is no more sustainable for our planet: as the world's population increases water resources shrink. For this reason, a wide range of innovative solution for water management have been developed and the water conservation plan of Songdo, the new city built from scratch in South Korea, is an example.

Mobility represents another important aspect that influences the quality of life in cities; improving the way people and goods travel into and around the city is essential. The term mobility management refers to different actions to be implemented: first of all, decrease congestion and resulting pollution, then offer people multiple types of urban transportation reducing the need to use the car, optimize travel safety and efficiency and improve capacity.

In order to make possible the connection of all cities' services, including energy, water and transportation, a communication network is indispensable. Connecting all sorts of things, both human and physical, helps to coordinate services and it improves their security and productivity while simultaneously preserves the natural environment. Just think of videoconferencing, a communication network widely available today; it is a useful tool for companies and it has positive impacts on work efficiency as well as on the environment because it reduces the need to travel to bring people together.

Thinking of a more distant future, communication systems will allow connecting all kind of objects within a network, without requiring human interaction: this is also known under the name of Internet of Things (IoT).

In this issue, it was decided to choose three websites, two of which analyze only one specific utility of the infrastructural system, in particular smartgrids.eu is the European portal for the promotion of smart grid technology and theinternetofthings.eu aims to become a point of reference in the debate about IoT, differently, the last website, stateofgreen.com, covers all the different infrastructural services (energy, water, environment, etc.) but only referring to the Danish experience.

SMART GRID EUROPEAN TECHNOLOGY PLATFORM
www.smartgrids.eu

The Smart Grids European Technology Platform (ETP SG) was established in 2005, when the European Commission Directorate General for Research, along with more than 100 stakeholders involved in the electricity networks sector, formulated the ETP's guiding principles, aiming to coordinate EU-level related initiatives.

One year later, in 2006, the Vision paper for ETP Smart Grids was presented, followed by the Strategic Research Agenda, in 2007. These acts intend to promote innovation in the European electricity networks, keeping an eye on the environmental targets and promoting the introduction of smart grids on the political agenda in the world.

More detailed information about ETP SG are provided in the section *ETP* of its website, where its mission and objectives are described, as well as its structure and activities. Furthermore, users can easily download the presentation brochure and other official documents, such as the Vision and the Strategic Research Agenda.

For those who are not very familiar with the smart grid matter, it is possible to know more about it reading the answers to over twenty-five frequently asked questions collected in the *FAQ* section of the ETP portal.

Many different EU initiatives have been developed to encourage the main goal of the Platform, that is "fostering and supporting the research and development of SmartGrids Technologies in Europe with a perspective towards 2035". One of the most relevant initiatives is the European Strategic Energy Technology Plan (SET-Plan), which aims to change the current energy system, making low-carbon technologies more convenient. The complete list of the major European initiatives is available in the section *EU Initiatives* of the portal, where a detailed description of each program is provided.

For those interested in actively participate in the platform, there are many possibilities to do it and you can find the most appropriate way for you in the section *Get Involved* of the website.

For example, you can subscribe to the ETP SG newsletter and be informed about news, or become a member of one of the two current active working groups. Another way to get involved in the project is to attend ETP events, public consultation and general assemblies or become a sponsor or partner of its activities. Moreover, if your real interest is to develop a smart grid project, and not just get involved, it might

be useful to consult the section *EU Projects*, which includes direct links to several websites of the European Commission, providing a sample of EU Smart Grids Projects.

In an age of economic uncertainty, the development of a smart grid initiative often requires financial support; with this aim, plenty of EU funding instruments are available and can be consulted in the section *Funding* of the portal.

The Smart Grids European Technology Platform represents an important point of reference to promote smart grid initiatives in our Continent, as well as to identify the top priorities that EU is required to implement as soon as possible, and its website is a useful tool for those who are interested in the subject and want to develop a smart grid project in Europe.

THE INTERNET OF THINGS - COUNCIL
https://www.theinternetofthings.eu

The Internet of Things (IoT) is a fairly new concept, recently become popular. It refers to objects equipped with identifying devices, which can communicate and be managed by computers.

What if your alarm sounds in advance because there is traffic on your way to work? Or the pill container alerts you when you forget to take it? The IoT is this and much more.

Each object provided with a RFID tag is connected to the Internet and is able to exchange data and information, acquiring a virtual identity that together with the physical helps to reduce the gap between analog and digital world. If presented in this way, the IoT appears as an attractive scenario, but there are still many doubts and misgivings about it: proponents argue that IoT creates social innovation, while critics are concerned about the privacy risks that would arise, in fact, data and information provided by RFID can be used by anyone if governments do not establish security and privacy requirements.

The debate is still opened and theinternetofthings.eu offers a platform for exchanging ideas and opinions about this question.

Theinternetofthings.eu is managed by the Council of the Internet of Things, which defines itself as "a loose group of professionals that want to host the full range of emotions and conceptual clarity that comes with grasping the territory, the full logistical, business, social and philosophical implications of the Internet of Things"; the Council is a think thank that counts over one hundred members and its mission is to develop a new perspective of the IoT that takes into account the positions of those in favor and those against.

The website consists of a large number of articles gathered in the *home* and in other four sections: *internet of things, who, what and mission*, depending on the topic.

The insights collected in the *home* are taken from different sources, like blogs, online communities or official websites; only a small excerpt from the original is published and individual authors are indicated in the title of each article. The *home* is updated almost daily and users interested in the date of publication of a paper should consult the source, where it is mentioned.

The section *internet of things* includes fifteen articles written by the Council describing the IoT from different perspectives: from the urban point of view to the individual.

Information about the Council, its birth and development, can be found in the sections *who, what* and *mission.* A very interesting initiative of the Council is the annual competition presented in the section *Contest*, but, unfortunately, the last to have been organized is that of 2011, on Panopticon. After the success of 2011 contest, it would be desirable to organize a new edition.

In the future, the idea of the Internet of Things will be more and more discussed and actual and the professionals who are part of the Council will continue to play an important role in initiating the debate on this topic.

STATE OF GREEN
http://www.stateofgreen.com/en

State of Green is a public-private consortium that involves the Danish Government, other Danish institutions and several commercial partners; it was born to put together all the "players in the field of energy, climate, water and environment".

Stateofgreen.com aims to be a global landmark for those who want to learn from the Danish experience. Not surprisingly, Denmark represents the most motivated country in terms of environmental sustainability, at global level: if it keeps the commitment of becoming independent of fossil fuels by 2050, Denmark will be the first state worldwide.

When you open the home page of Stateofgreen.com it is possible to explore the website by choosing between three main sections: *Solutions, Products* and *Profiles*. The portal offers an extraordinarily extensive database gathering more than thousands of solutions, products and profiles; it is possible to customize your search choosing the type of filtering that best suits you, for example, you can sort the database by alphabet or most recent, as well as filter it by theme, such as *Intelligent Energy, Heating & Cooling,* or *Solar & Other Renewables*. Another original way to browse the database is to display it on Google map; this tool is available for Solutions and Profiles, but not for Products.

A wide sample of projects implemented all over the world, from Greenland to Mozambique, is collected in the section *Solutions*. One of the most viewed project regards the construction of "World's First" Smart Grid system on the Faroe Islands: a virtual power plant will supply the Islands with energy, integrating the wind generation expected over the next two years. Together with this solution, there are also many other interesting initiatives, for example the Danish capital's cloudburst mitigation plans, the renovation of the Scandinavian Design College, or the construction of the largest energy-efficient supermarket in Sweden.

With regard to the section *Products*, the list collects a large number of tools used for energy-saving activities like turbines, soot blowers, heat exchangers, and so on. New generation materials are also included in the database: rubber granulate mixed with polyurethane for playground applications or modified asphalt (Road+) for new roads are just two examples.

In the end, the section *Profiles* is devoted to companies working in the field of green economy which are involved in the innovative solutions and/or products presented in the previous sections.

Another way to explore Stateofgreen.com, other than select one on the three main sections, is to choose between eight specific sectors: *Intelligent Energy, Energy Efficiency, Heating & Cooling, Water, Bioenergy,*

Wind Power, Solar & Other Renewables, Resources & Environment. For each sector, the portal offers a descriptive sheet including an interactive video, news and direct links to the related solutions and products.

For those who are not satisfied with the content offered by the website, but want more, there is the opportunity to live the Danish experience firsthand, with the *State of Green tours*. Over four thousands of people, including journalists, businesses and politicians, have already visited Denmark and had the opportunity to find inspiration by the excellent results the country obtained in terms of energy saving and sustainability.

Danish commitment to share its experience with other countries in the world is an example of forward-looking policy; good practices that have already been successfully implemented somewhere are a heritage to be shared, because they can create development in another part of the world.

IMAGE SOURCES

The images are from: http://www.iteresgroup.com/services/smart-grid/; http://www.paneuro.net/smart-grids-european-technology-platform/; http://rusland.um.dk/en.aspx; http://www.zdnet.com/the-internet-of-things-sizing-up-the-business-opportunities-7000009301/.

02

FLORIANA ZUCARO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: floriana.zucaro@gmail.com

In this number
SMART GRIDS AND SMART TRANSPORT NETWORKS

City development is inextricably linked to technological innovation: most cities' grow is due to new work or special production technologies that required a specific spatial location and their destiny was influenced by the greater or lesser capacity to adapt its economic and social structure to the evolution of existing technologies or the emergence of new technologies which quickly replaced the previous. In addition to playing a central role in the evolution of technologies, cities are also the location where most future and actual challenges have been taking place and in this perspective the widespread use of new technologies, especially information and communications technologies (ICT), can be considered as the pillar for making up a smart city. According to literature, the concept of smart city developed during the last decade is a combination of ideas about how ICT can increase efficiency and competitiveness of urban systems (Batty et al. 2012). A lot of cities, together with technology companies, are focusing on becoming smart, making the effort to coordinate, couple and integrate several kinds of technologies that have synergies in their functioning, in order to find out new opportunities which will improve the quality of life. Regarding it, Pike Research estimates that smart city technology market will grow from 6,1$ billion annually in 2012 to 20,2$ billion in 2020. Nevertheless it is worth noting, as it has been made in the first issue of this year, that the "smartness" of a city depends on people who live there and not merely in the technologies that are used. However, without analyzing the relationship between new technologies and urban transformations, this section wants to focus on the investments and progresses that have been making both in the sector of electricity networks, the smart grids, and transport. According to the International Energy Agency (IEA), energy efficiency is one of the largest influencing factors for achieving the ambitious targets for CO_2 reduction and transport sector is strictly linked to the energy issue.

In this perspective, three documents are proposed: the first proposal is a report related to European smart grid projects; the second one describes how smart technologies could play a vital role in bringing the vision for convenient, joined up, multi-modal sustainable mobility; the third is a EC assessment on the developments of the infrastructure for electric, hydrogen and natural gas vehicles.

Title: Smart Grid projects in Europe: lessons learned and current developments
Author/editor: AA VV
Publisher: Joint Research Center
Download: http://jrc.ec.europe.eu
Publication year: 2013
ISBN code: 978-92-79-28604-9

The Joint Research Centre (JRC), the in-house science service of the European Commission, has just published this 2012 update of the inventory of smart grid projects, in order to establish an open platform for the collection and dissemination of project information involving all Member States, international organizations and energy operators. The JRC was able to set up the most updated and comprehensive database of smart grid projects (281) and smart metering pilots and roll-outs (91), through both a survey distributed to European associations, system operators, utilities and Member State representatives and a wide search of project information. The report comprises a wide range of projects, attesting how smart grids can help use more renewable resources, accommodate electric vehicles, give more control to consumers over their energy consumption, avoid blackouts and restore power quickly when outages occur. All the projects analyzed relate to new technologies and resources to make the electricity grid smarter, (according to the concept of smart grids developed in 2006 by the European Technology Platform for Smart Grids) and they have been focused on the applications enabled by them, policy goals, consumer involvement and social impacts, in order to provide a more correct assessment of the projects. A key finding of the report is a significant geographical imbalance: the smart grid projects are irregularly spread across Europe, with the vast majority of investments, amounting to about 5.5 billion €, made in old Member States, while new Member States (EU 12, mostly in Eastern Europe) tend to slow up. This situation can represent a weakness for Europe that should deal with the slow progress being made in EU 12 more efficiently, in order to reach the objectives of an integrated market. Italy is among the seven countries where 70% of all projects have been realized: the public investments in research and development (R&D) projects have been increasing since 2010, thanks to European financing instruments (European Regional Funding and Seventh Framework Programme) and innovation or energy ministries of each country. The opportunity to cooperate with companies and organizations of different countries involved in a multinational project has also fostered the national public investments in smart grids. Therefore smart grid projects have been driving by government grants and other public support (about 55% of the total budget comes from non-private funding sources) revealing just how important that backing is to stimulate private investment. The report confirm the finding of another recent report on smart grids (Pike Research's), which estimates that Europe will invest around 56 billion € in smart grid technology by 2020. EU directive establishing that member states have to replace the 80% of their meters with the smart ones, is driving the growth of investments and development projects in this sector: Europe has invested at least 5 billion € in smart meters, including 2.1 billion € for Italy's rollout of 36 million smart meters from 2001 to 2008. The report describes briefly 20 good practices, in order to demonstrate under which conditions energy efficiency measures can be implemented successfully. In all these case studies the cooperation and participation of stakeholders and clear demonstrations of the ability of the industry to address privacy and security concerns are the key elements to foster progress in the smart grid sector, in order to provide the necessary underpinning to Europe meeting its 20-20-20 goals.

Title: Smart Mobility for a 21st Century America: strategies for maximizing technology to minimize congestion, reduce emissions, and increase efficiency
Author/ editor: AA VV
Publisher: Transportation for America
Download: http://t4america.org/
Publication year: 2010
ISBN code: n.d.

The goal of this report is to provide policy recommendations for the Congress and the USA government that had to prepare the new transportation bill, in order to emphasize how establishing national targets for reducing congestion and emissions through programmatic changes and funding incentives can accelerate the development of innovative, new information systems and technology solutions: "investment in technology and innovation can help to solve nation's most critical transportation problems".

The report has been made up by several American leading transport organizations dedicated to advancing the research of transport systems and it has released in conjunction with the IBM Smarter Transportation Virtual Forum to discuss urban mobility and the growing spread of technology solutions. The report in fact aims at demonstrating how emerging technologies can increase capacity on congested highways, help commuters avoid traffic delays, and expand and improve transportation options while saving money and creating jobs. According to several studies related to saving money in transport sector through the use of innovation technology, the report highlights that intelligent transportation systems (ITS) and other smart technologies are cost effective and quick to deploy: for instance, synchronized and adaptive traffic signals allow to yield a 40\$ return in time and fuel savings for every 1\$ invested, while also reducing CO_2 emissions by up to 22% and travel delays by 25% or more. Instead of describing improvements to vehicles and cleaner fuels, which are the most talked-about technological innovations, the attention is focused on smart technologies are being deployed today to improve system efficiency and reduce travel delays, provide more convenient access to transportation alternatives, and even customize routes based on real-time traffic conditions. These innovations are grouped into five categories, according to the target to reach:

− making transportation systems more efficient;

− providing more travel options and multimodal connectivity;

− providing travelers with real-time, more accurate and more connected information related to transportation system;

− making pricing and payments more convenient and efficient;

− reducing trips and traffic.

The report suggests adopting a plan to incorporate technologically advanced solutions throughout the transportation system, in order to "leverage existing capabilities and create a seamless interoperable network".

According to the five categories of innovation just described, the report illustrates more than ten case studies, referred both to America and Europe countries, to explain how smart mobility solutions can give benefits to regions, cities and business. In conclusion, by reading the information provided and taking a look at the case studies, planners and decision makers can know ideas and solutions that could be implemented to intelligently strengthen mobility options in their local communities, through linking technology and transport systems to increase efficiency, affordability and accessibility.

Title: Impact Assessment-accompanying the document Proposal for a Directive on the deployment of alternative fuels infrastructure
Author/editor: AA.VV.
Publisher: European Commission
Download: http://ec.europa.eu/transport/themes/urban/cpt/
Publication year: 2013
ISBN code: n.d.

Within this package's measures Clean Power for Transport Package launched by EC in July 2013, in order to create a single market for innovative and alternative fuels, there is an Impact Assessment that evaluates cost and benefits of different policy options and finds best conditions for a comprehensive coverage of the main alternative fuel options. This report demonstrates that the infrastructure for electric, hydrogen and natural gas vehicles is likely to remain insufficient for what broad market take-up would require. In order to provide a solution, the reasons that prevent the deployment of alternative fuels are discussed: the high price of vehicles, the lack of recharging infrastructure, caused by several market failures, and the poor consumer acceptance, which is strongly affected by the availability of recharging stations. All these three factors create a vicious circle: investors do not invest in alternative fuel infrastructure because of an insufficient number of vehicles and vessels, the manufacturing industry does not offer alternative fuel vehicles and vessels at competitive prices as there is insufficient consumer demand, and consumers do not purchase the vehicles and vessels for lacking of dedicated infrastructure. This endless circuit requires a great coordination among the different subjects involved, such as happened in some demonstration projects in which car-makers and electricity utilities have joined their forces to provide consumers with a full package of vehicle, home charging point and a few public charging stations. In this way, the final consumers, who need to be convinced about the attractiveness of alternative fuel vehicles, will tend to purchase them only if they are assured about the availability of sufficient recharging/refuelling infrastructure. The current state of play of infrastructure networks is not nearly encouraging: most Member States do not have a significant number of charging points and the electricity charging infrastructure has been continuing developing in a fragmented way. The existent network of private and public charging points is expected to increase significantly only in France, while in the rest of EU, only 600.000 points are expected to be deployed by 2020, further aggravating the already existing imbalance among Member States. The situation is even worse both for hydrogen and gas: in the first case 90 refuelling stations are mainly located in Denmark, Germany, the Benelux states and the United Kingdom. Nevertheless, several Member States such as Denmark and Germany, have been working on detailed plans for hydrogen, thanks to industry projections that show that hydrogen fuel cell vehicles can become cost-competitive with conventional vehicles in the medium-term infrastructure deployment. Regarding liquid gas there are totally 20 terminal, while just Italy and Germany have stations for compressed gas. In order to ensure the provision of a sufficient infrastructure network the EC has identified four policy options; among them, the one that could accelerate the market development of alternative fuels and ensure that investments have a larger impact on economic growth in Europe, is related to the definition of basic criteria for minimum infrastructure coverage for Member States.

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Batty M. *et al.* (2012), "Smart cities of the future", *The European physical journal-special topics*, 214:1, 481-518.

03

SMART CITIES: RESEARCHES, PROJECTS AND GOOD PRACTICES FOR
NETWORKS AND INFRASTRUCTURE

REVIEW PAGES: LAWS

VALENTINA PINTO
TeMALab - Università degli Studi di Napoli Federico II, Italy
e-mail: valentina.pinto@unina.it

In this number
ALTERNATIVE FUEL INFRASTRUCTURE EXPANSION: NEW NETWORKS FOR CHARGING ELECTRIC VEHICLES

In this issue, the laws section examines the European regulations and the new energy government of the territory tools set up for the development and the implementation of infrastructure networks for charging electric-powered vehicles. The aim is to provide a comprehensive picture of the role that the law has on the spread of this kind of infrastructures in Europe and in Italy.

Future electricity networks will play a key role for the achievement of the goal set by the EU for 2020: to transmit and distribute about 35% of electricity from dispersed and concentrated renewable energy sources. To do that, electricity networks have to respond to three interrelated challenges: creating a pan-European market; integrating a massive increase of renewable energy sources; and managing interactions between millions of suppliers and customers, including owners of electrical vehicles (EC 2011).

The contents have been organized as follows: the first paragraph illustrates the European regulatory framework for the development of cleaner fuels and related infrastructure, the so-called "Clean Power for Transport package" (2013), made up to facilitate the development of a single market for alternative fuels for transport in Europe including the appropriate infrastructure.

The second paragraph analyzes the specific measures relating to recharging infrastructure for electric vehicles contained within one of the documents that make up the regulatory instrument package: the "proposal for a Directive on the deployment of alternative fuels infrastructure" (COM(2013)18) that establishes a common framework of measures for the deployment of alternative fuels infrastructure in the European Union.

The third paragraph is dedicated to the description of the implementation of these provisions in Italy (through the law n.134/2012) and it examines the main contents of the "National Infrastructural Plan for recharging electric vehicles " that is aimed at implementing infrastructure networks for recharging electric-powered vehicles and measures to recovery the building stock for the development of the networks.

CLEAN POWER FOR TRANSPORT: ALTERNATIVE FUELS FOR SUSTAINABLE MOBILITY IN EUROPE

According to the United Nations Economic Commission for Europe (UNECE 2009), the global car fleet is predicted to grow from 800 million to 1,6 billion vehicles by 2030. Negative externalities from the transport sector are therefore one of the main factors to mitigate in order to achieve the objectives that the EU has set for 2020 on the reduction of greenhouse gas emissions, energy efficiency and use of renewable energy.

In view of the scope of change required for a low carbon transport system, the European Commission in the report "Infrastructure for alternative fuels" (2011) analyzes the current regulatory framework and identifies the gaps that prevent the achievement of such change. These gaps can be attributed to the different technological choices made up in these years by some Member States to promote alternative fuels that lead to: isolated national or regional markets, fragmentation of the internal market for alternative fuels and technology "border lines", which inhibit mobility with alternative fuels across Europe. In addition, directives and communications prepared by the European Commission have so far focused mainly on setting emission performance standards for new passenger cars (reg. 443/2009), on vehicle technology development (COM (2010) 186), on the identification of the main alternative fuels to oil (COM(2013)17), whilst the build-up of the necessary infrastructures has been neglected. The CARS 21 High Level Group report of 6 June 2012 states that the lack of a Union-wide harmonised alternative fuel infrastructure hampers the market introduction of vehicles using alternative fuels and delays their environmental benefits.

To fill these gaps the European Union provides a specific strategy on alternative fuel infrastructure with the Clean Power for Transport Package that has three main goals: to overcome transport dependency on oil, introduce alternative fuels in order to lower greenhouse gases (GHG) emissions, and to kick start the market for alternative fuels in the EU. The Clean Power for Transport Package falls within the broader Europe 2020 flagship initiative "Resource-efficient Europe" which seeks to promote new technologies to decarbonise the transport sector (COM (2010)186) and it is in line with the White Paper "Roadmap to a Single European Transport Area" (COM(2011)144) that sets a target of 60% greenhouse gas emissions reduction from transport by 2050.

In particular, the Clean Power for Transport Package is made up of:

- the Communication "European alternative fuels strategy" (COM(2013)17) that evaluates the main alternative fuel options available to substitute oil whilst contributing to reduce greenhouse gas (GHG) emissions from transport, and suggests a comprehensive list of measures to promote the market development of alternative fuels in Europe;
- a proposal for a "Directive on the deployment of alternative fuels infrastructure" (COM(2013)18), aimed at ensuring the build-up of alternative fuel infrastructure and the implementation of common technical specifications for this infrastructure in the Union (Allsaar 2013);
- an Impact Assessment report (SWD(2013)5/2) that evaluates cost and benefits of different policy options and find best conditions for a comprehensive coverage of the main alternative fuel options.

THE DEPLOYMENT OF RECHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLES: THE EUROPEAN STRATEGY

The proposal for a Directive on the deployment of alternative fuels infrastructure establishes a common framework of measures for the expansion of alternative fuels infrastructure in the Union "in order to break the oil dependence of transport and sets out minimum requirements on alternative fuels infrastructure build-up and common technical specifications, including recharging points for electric vehicles" (EU 2013).

The most detailed measures are provided in the field of electric vehicles technology that has a significant potential to radically address a number of challenges facing the European Union (global warming, dependency from fossil fuels, etc.) and it appears to be most promising for urban use (EU 2010). The regulations concerning the electricity supply for transport provide that each Member State shall ensure a minimum number of recharging points for electric vehicles according to the urbanization rate of the State. It follows that states such as Germany, Italy and the UK, where there are the highest rates of urbanization, should establish a minimum number of recharging points equal to more than one thousand units, unlike states such as the Netherlands or Poland whose minimum is equal to approximately 40,000 units. In addition, to realize an effective recharging network at European level the proposal provide investment in electric recharging points based on common standards in order to allow all electric vehicles to be charged and to communicate with the electricity grid anywhere in the EU and also with all types of chargers.

In addition, each Member State shall adopt a national policy framework for the market development of alternative fuels and their infrastructure, that will contain at least the following elements:

− measures to support the build-up of alternative fuels infrastructures, such as building permits, parking lots permits, fuel stations concessions;

− policy measures supporting the implementation of the national policy framework such as direct incentives for purchase of alternative fuels means of transport or building of the infrastructure, possibility of tax incentives to promote alternative fuels means of transport and infrastructure; demand side non-financial incentives: e.g. preferential access to restricted areas, parking policy, dedicated lanes;

− deployment and manufacturing support measures, such as yearly public budget allocated for alternative fuels infrastructure deployment, differentiated by fuel and transport mode (road, rail, water and air) or yearly public budget allocated to support manufacturing plants for alternative fuels technologies;

− 2020 national targets for the deployment of alternative fuels in the different transport modes (road, rail, water and air) and for the relevant infrastructure;

− national targets, established year by year, for the deployment of alternative fuels in the different transport modes and for the relevant infrastructure in order to achieve 2020 national targets;

− number of alternative fuel vehicles expected by 2020.

THE ITALIAN NATIONAL POLICY FRAMEWORK FOR ALTERNATIVE FUELS AND THEIR INFRASTRUCTURES

The transposition of the European Directives on alternative fuels infrastructure in the Italian law system is due to the low n.134/2012 governing "Urgent Measures for the nation growth", more known as "Development Decree". This law dedicates a specific Chapter (Capo IV bis) to legislations aimed at promoting the development of sustainable mobility through specific measures to encourage the development of recharging infrastructures for electric vehicles and the deployment of public and private low-carbon fleets, with particular reference to the urban context. Article 17-septies, in particular, introduces the "National infrastructural Plan for recharging electric vehicles (PNire)" in order to ensure minimum levels of accessibility to the recharging electric-powered vehicles infrastructure throughout the country.

The PNire is aimed at implementing infrastructure networks for recharging electric-powered vehicles and measures to recovery the building stock for the development of the networks. To implement the plan, the Government has put in place funding for a total of € 50 million. The funding provided by the Ministry amounted to € 20 million for 2013 and to € 15 million for each of the years 2014 and 2015.

The PNire will be implemented in two phases: the first phase (2013-2016) concerns the definition and the draw up of the Plan; during the second phase (2017-2020) is planned to complete the construction of the charging infrastructure networks in order to cover the entire national territory and to enable a large-scale deployment of electric vehicles. Regarding the criteria used for the location of the charging infrastructure, the Plan gives priority to the construction of the infrastructures in urban and metropolitan areas in the short term (1-2 years), then it provides to expand the focus on highways and suburban areas in the medium and long term (3-5 years). The development of the charging networks will be sized on the basis of the urbanization of different areas; in this regard the Plan defined a set of attributes and variables that must be taken into account to identify the minimum number of charging infrastructure (both public and private) needed to cover a given geographical area in the country. The attributes to be identified for each reference area are: the population, the population density, the territorial extension and the working population. The variables to cross with the attributes are, instead: motorization rate, the percentage of electric vehicles and the level of CO_2 emissions in the given area.

Important changes are introduced also in the field of urban and regional planning. The PNire provides for the review and the integration of the Mobility Plan and Urban Development Plans with specific provisions on electric mobility. In particular, the competent administrations must provide for the integration of the local and regional mobility Plan with a special section dedicated to electric mobility, or alternatively, they should develop a specific plan of electric mobility. On the other hand from the urban point of view the Plan expects to adequate the urban planning instruments with minimum standards regarding the amount of public facilities for charging electric vehicles. In addition, by 1 June 2014 the release of the building permit will undergone to the implementation of electric vehicle charging stations which facilitate the connection of a car from each parking space and from each box car (MIT 2013).

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IMAGE SOURCES

The image are taken from:www.avere.org; www.rinnovabili.it; www.mit.gov.it.

04

REVIEW PAGES: URBAN PRACTICES

GENNARO ANGIELLO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: gennaroangiello@yahoo.it

In this number

SMART INFRASTRUCTURES: THREE CASE STUDIES

Climate changes, rising energy prices and technology advances are driving the change to new levels of efficiency and innovation in infrastructures management. In this context, the concept of "smart infrastructure" or "smart system" has attracted considerable attention over the past few years.

Smart infrastructures are currently a hot topic under discussion by governments, researchers, media and others. However, a generally accepted definition of "smart infrastructures" has not been established yet.

In our opinion, a smart infrastructure is an infrastructure that uses a feedback loop of data to improve its performances. More in details, a smart infrastructure uses ICT-based technologies such as sensors, meters, digital controls and analytic tools to reduce the overall running operational costs.

More efficient and environmentally friendlier systems for managing, among other things, commuter traffic, electric grids, waterways and waste collection have been recently developed in cities around Europe, United States and Asia.

In this paper, we present three relevant case studies of smart infrastructures:

− Thessaloniki's intelligent urban mobility management system;
− Malta smart energy and water grid;
− Philadelphia smart waste collection system.

The case studies aim to analyze the currently emerging opportunities offered by this new approach to smart and sustainable infrastructures management and to identify common successful factors. In this regard, an active citizen engagement trough technology, as well as a strong collaboration between key players (i.e. local governments, public utilities, research centers and large companies) have emerged as important common conditions for the successful implementation of a smart infrastructure.

With different strategies and different solutions, the case studies analysed have shown how smart technologies such as low-cost sensors for real-time collection, clever software for analytics and visualizations as well dynamic control systems can be key factors to tackle efficiency and environmental issues and pave the way to a smarter and greener environment.

THE THESSALONIKI'S INTELLIGENT URBAN MOBILITY MANAGEMENT SYSTEM

The city of Thessaloniki has experienced an increasing growth in traffic congestion and urban pollution over the last years. These traffic and environmental problems have created a direct negative impact on the economic development and functional character in the central area of the city (Morfoulaki et al., 2011).

In 2009, the Hellenic city launched an ambitious project aimed to reduce the negative influence of traffic congestion and gaseous pollutants.

Smart technologies, real-time data and travel behavioural changes are the key ingredients of the Thessaloniki Urban Mobility Management System (TUMMS), a collaborative project involving the key players of the city dealing with urban mobility, transport and environment. Indeed the project is the result of a unified effort between research centers (the Hellenic Institute of Transport, the National Observatory of Athens and the Norwegian Centre for Transport Research), local and regional authorities (the Municipality of Thessaloniki and the Region of Central Macedonia) and transport authority (Thessaloniki's Integrated Transport Authority).

The system aims, through the services provided, to help travellers move around the city easily, avoiding the traffic congested areas, to raise the environmental public consciousness and to promote public transportation and alternative ways of transport (walking and cycling). At the same time, through intelligent traffic management and control in the central area of Thessaloniki, the system aims to improve the flow of vehicle traffic and the safety. The Intelligent system is divided into two separate service Centers that act complementary and parallel: the Center for Urban Mobility and the Traffic Control Center.

The Center for Urban mobility aims to promote, enhance and facilitate the access to transport services for the end users. In particular, the Center informs citizen about alternative routes when planning their journey, providing them with the optimal solution using real time data and suggesting them the most environmentally friendly route. Targeted solutions is one of the most innovative factors. Indeed, the travellers can define several criteria while consulting the service. They can choose the transport mode of them preference (car, public transport, combined transport, walking or cycling), the maximum desired walking distance (100, 200 or 300 meters) and different types of routes (the fastest route, the shortest route in length, the most environmentally friendly route or the most cost efficient route in terms of fuel consumption).

The total travel time is calculated based on real-time traffic data of the road network, while the information are provided through information points, mobile phones and through the centre's website. Furthermore the Centres provides travel information services such as real time traffic conditions of the road network, daily air quality conditions of the city, public transport information related to bus routes, timetables and bus stop areas.

The Traffic Control Center aims to manage the traffic demand using real-time traffic data. Indeed, real-time traffic data are collected from cameras and speed sensors and elaborated in order to develop dynamic management of traffic lights, to estimate the traffic condition for future periods within a day, to manage traffic around road incidents.

One of the most innovative element of the TUMMS is the direct involvement of citizens in planning their trips, giving them the right and the opportunity to actively contribute to the improvement of the environmental quality of the city. In doing this, the Center also provides special urban mobility training programs that aim to form a new culture for urban mobility in the city.

The TUMMS is recognized to be an essential and active intervention on environmentally friendly management of urban transport demand and is delivering excellent performances. The use of public transport means for trips to and from the centre of Thessaloniki is increased from 25% to 45% over the past two years, while the atmospheric air pollutants are decreased by 20% in in the city centre (Mitsakis and Grau, 2011).

MALTA SMART ENERGY AND WATER GRID

Malta has no connections with the European electricity grid and its electricity is actually generated entirely by imported fossil fuel—insufficient to support its growing economy and unsustainable environmentally for the long term. In addition, its power and water systems (and markets) are intricately linked: the country depends on electrically powered desalination plants for over half of its water supply. For this reason, about 40% of the cost of water on Malta is directly related to energy production cost. Furthermore, rising sea levels and over-exploitation are threatening Malta's limited freshwater supplies.

In 2008, The Maltese national electricity and water utilities - Enemalta Corp. and Water Services Corp. - have selected IBM for a five-year agreement to design and deliver a nationwide Smart Grid implementation aimed to improve the operational efficiency of both the water and power supply systems, to lower energy and water costs and to reduce greenhouse gas emissions. These benefits will be achieved through a large investment in smart technologies that will work together in order to create a data-driven system for the intelligent management and control of the water and power supply. Indeed, by integrating the two systems, it will be possible to identify both water leaks and electricity losses in the grid, allowing the utilities to more intelligently plan their investments in the network and reduce inefficiency.

The project involves replacing 250,000 analogic electric meters with smarter meters and connect these and the existing meters to advanced information technology applications. An analytic tool will transform sensor data into valuable information. With this vast amounts of information that the system will generates, government officials, the utilities, and citizens will be able to make more informed decisions. These technological solutions will be integrated with new back-office applications for finance, billing and cash processes.

One interesting aspect of the project deals with the consumers' involvement in saving water and energy. The actual consumption and billing data will be available to customers via a web platform and compared with that of people with similar households. In this way the project aim helping customers understand their own consumption patterns and raising them awareness about their energy and water use and behavior.

PHILADELPHIA SMART WASTE COLLECTION SYSTEM

Waste management is a basic requirement of ecologically sustainable development for city and town in US, which are among the highest waste producers in the world (Hoornweg, Bhada-Tata 2012).

The city of Philadelphia has experienced increasing cost of waste collection over the past years as result of thousands of wasting trips to pick up partially full trash beans.

In 2009, the City of Philadelphia installed a network of 1,000 solar waste and recycling stations produced by the Big Belly Solar Company aimed to optimize the waste collection system, to reduce carbon footprint and to make public spaces more attractive for citizens, businesses and visitors. The project uses real-time data and analytics to drive operational planning and resource allocation in a more efficient way. Each waste station is composed by one or more modular smart beans that can contain up to five time more trash than a conventional basket of the same volume thanks to an inside-built waste compactor. This allowed an increased on-site capacity and substantial reduction in collection points that result much easier to manage. Each bean is equipped with a sensor and a wireless transmitter for data collection and dump bins remote management. Energy is supplied to the bins through a rechargeable battery and a photovoltaic solar panel. The modular system allows designing right-size capacity waste station according to the location characteristics in a more fiscally responsible way.

The smart collection system is based on the monitoring of the fill levels of each waste and recycling container in real time using wireless sensor devices. The sensors continuously send readings on the waste levels to the waste management company server, which analyses when and how the containers should be emptied. The information goes straight to the waste management company's logistics system that can calculate a precise time and route so that the waste management company can optimise the use of its collection vehicles.

The system has originated significant savings, along with environmental impact reduction and making the separate collection of waste easier. In particular, the system has helped to achieve savings of about 30% in waste collection costs, derived from reduced collection frequency, including fuel, staff hours, equipment usage and street wear-and-tear reductions. This means a saving of 1 million dollars per year that allowed paying the initial investment in about three years.

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IMAGE SOURCES

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05

REVIEW PAGES: NEWS AND EVENTS

GERARDO CARPENTIERI
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: ger.carpentieri@gmail.com

In this number
SMART NETWORKS AND INFRASTRUCTURE

In recent years the use of smart technologies is rapidly spread in the field of networks and systems infrastructure dedicated to the transport of goods, informations and people. in this case, as for other sectors, also the types of application are numerous and the economic and environmental benefits resulting from their use are many and easily quantifiable. So, given the complexity of large infrastructure composed by a large number of technological elements and not, that they must continually interact between them in an efficiently and effective, having to ensure higher levels of services. So the investments in the field of smart infrastructures by the companies and institutions that deal with research, both on the part of the administrative authorities is increasing. One of the conditions that favors the employment of smart technologies is also the immediate economic and environmental impacts that could be obtained from their use. In fact there are many examples of the application of these technologies that have led to immediate positive. An example is the collaboration between General Electric and the Norfolk Southern rail company, through the application of smart systems for monitoring, control and management of the railway transport, has been able to significantly reduce all the elements that constitute a source of most economic expenditure and pollution. The positive effects generated have allowed the optimization of the use of the means of transport by rail, with the reduction of the times of non-use, improving the safety and comfort of travel, through the use of sensors on the infrastructures and means in such a way to interface. The application of these technical solutions allowed to increase on average of 10-20% of the traveling speed of trains, with an annual reduction of total cost of ownership of about $ 200 million. Another solution is proposed by Cisco, in collaboration with the Austrian highways network has developed a system of sensors and signals along the highway networks to able to provide immediate information to network managers and users the system was developed to operate even in extreme weather conditions. In some cases, it can optimize the use and management of infrastructures even with interventions intangible, one of the many examples is the development of dedicated applications for mobile electronic devices. For example, as the case with the collaboration between IBM and Air Canada, which has led to the development of an application that allows

airline passengers to carry out all the procedures for check-in directly from your Smart Phone or Tablet, in this way it is possible to reduce the waiting at the airport. So the possibilities of the application are many and not reguarding only the transportation infrastructures, but also complex systems of water management, water supply, waste, emergency and a full range of services through the use of smart technologies. In the next years this procedure will increase their efficiency and also to allow a greater number of people to access.

Given the great interest that is developing against the use of smart solutions dedicated to major infrastructure. There are numerous events worldwide and continental planned for the coming months. The following are some of the most important fairs and congresses and interesting organized in Europe and the world.

One of the sectors most interested of the use of new smart solutions are the transport infrastructure. In the coming months, one of the first events scheduled, dedicated to this sector and the IT Solutions for Public Passenger transport, will take place in Karlsruhe, Germany from 18 to 20 February. The event is organized from UITP (International Association of Public Transport), the international network of the public transport companies, policy makers, scientific institutes and all those part of the public transport sector. It is a platform for international cooperation on these issues, with more than 3,400 members from 92 countries. This event now in its third edition, is held every two years, to show the industrial advances of smart technological that will contribute in the near future to make public transport more sustainable, efficient, safe. The edition of this year aims to present the latest innovations relating to sales systems and management of tickets, collection and analysis of travel data, models of business management, with particular attention to all those solutions that allow the integration of existing technologies for the creation of new services.

Another important event dedicated to transport infrastructure is the Smart Rail Congress & Expo, which will take place in Amsterdam February 24 to 26, this event contains two different events Signalling and Train Control and Railway Telecoms. The Signalling and Train Control is the main event on this subject in the world, with a participation in the previous editions of more than 400 railway experts, in the main exhibition themes and discussion this year will be:

– improve ROI from ERTMS with innovative financing;
– reduce costs and delays through successful project management;
– increase capacity and efficency with effective traffic management;
– maximise safety through improved testing and certification;
– ensure competitiveness through operational Harmonising rules.

While the second event of the Railway Telecoms, took part in previous editions of over 200 industry experts, the main issues that will be discussed are:

– increase ridership by putting the passenger at the heart of developments;
– future proof systems and roll out next generation technology;
– reduce costs and improve service through system convergence;
– enhance capacity and greater reliability through automation;
– improve operational performance with the next generation of GSM –R.

In relation to the infrastructure for smart transport systems and mobility management, will take place in Amsterdam, from 25 to 28 March, the Intertraffic, one of the largest exhibitions of world on these issues. The event takes place every two years allows during the four day event professionals from all over the world to meet and discuss these issues and industry leaders to present the latest products. Given the importance

that covers the use of smart solutions in the field of mobility and that their application has become essential for the functioning of the city during the event will be organized a focus to explore the complexity of urban mobility and the role that advanced technologies are playing in providing innovative solutions to support the development of cities .

The realization of Smart Grid has the objective of ensuring the maximum reliability for networks to prevent and manage critical situations. In fact, in the coming months are also planning a series of events focused on the use of smart solutions related to the general theme of the Smart Grid. In particular, one of the upcoming international events planned is the World Smart Energy Week to be held in Tokyo from 26 to 28 February. The organizers have grouped during this expo 8 different events dedicated to smart energy issues. For this edition, the organizers provide the presence of over 2,100 exhibitors and more than 90,000 visitors. During the World Smart Energy Week will take place the 4th INT'L SMART GRID EXPO, where exhibitors will display the latest technologies and services related to Smart Grid.

Another important conference focused on Smart Grid is the 5th Smart Grid Summit to be held in Malaga in Spain from 29 to 30 April. To this conference participate every year the main European companies that deal with the distribution of energy, the authorities and investors. The Smart Grid projects will also develope worldwide. The discussion sessions of the conference during the days will be organized in different discussions:

– Smart Cities and Regions;
– Customer Management;
– Operational excellence;
– Creating ICT platforms for sustainable growth;
– Microgeneration.

Another event related to the Smart Grid will take place in Istanbul from 8 and 9 May, the event will also participate in the industry's leading companies. This event will be an opportunity to start the discussion on the advantages and disadvantages expected from the development and use of Smart Grid. Some debates will be carried out also on rules that regulate the development and use of the Smart Grid and the administrative and technical barriers associated with them.

An essential role for the development of all these new opportunities offered by technological evolution is covered by the networks of communication that allow the various technological systems to communicate and interact with each other. In fact it can say that what has allowed in recent years to start the development of smart solutions was the invention of the internet, which with its spread has allowed a greater number of people to exchange a growing amount of information in real time. The evolution of the combined use of the communication networks and automation technologies have led to the birth of the concept of the Internet of Things. The goal is to ensure that the electronic world draw a map of the real world, through the assignment of an electronic to identity to the various objects and physical locations. So in the near future the objects that surround us will have to be recognizable and be able to communicate with the each others, so you can react appropriately to stimuli to which they are subjected. The evolution of all this will lead, as stated by Neil Gross in 1999, "In the next century, planet earth will do an electronic skin . It will use the Internet as a scaffold to support and transmit its sensations ."

The revolution that will generate over the next few years the technology of the Internet of Things derives from the possibility to apply this technology in any industry, from the care of their own health care of the garden of the house, to the management of large infrastructure projects , and both the change the current

mentality which believes that is only man, the only one able to be able to enter information into computer systems, to make them work properly. Despite the Internet of Things is a very recent, already are numerous and high-level projects undertaken all over the world, and companies such as Cisco are evolving and expanding even more this concept through the Internet of Things by Internet of Everything, with the objective of developing smart grids, that allow be related directly and without barriers the people, the objects, the processes and the data.
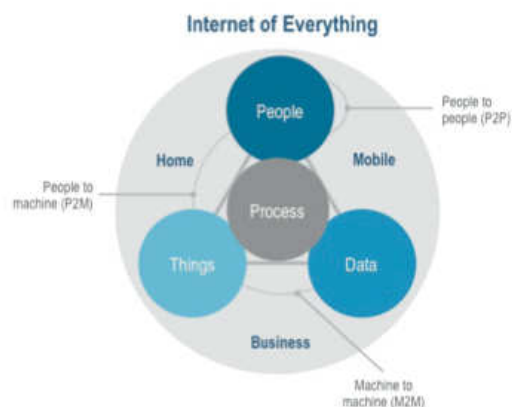

Fig.1 - IoE Brings Together People, Process, Data, and Things To Make Networked Connections More Relevant and Valuable.

One of the major events that will take place in the coming months which will address the issues of the Internet of Things is the IEEE World Forum on Internet of Things, will be held in Seoul in South Korea from 6 to 8 March. This event is organized by the IEEE (Institute of Eletronics and Eletronical Engeneers), this organization present throughout the world and founded in 1884, is divided into regional and thematic sections. The IEEE is the largest professional company in the world, which deals with promote technological innovation and excellence in the electronics industry and energy sectors. The IEEE World Forum on Internet of Things is organized to show the state of scientific research in the Internet of Things and will be divided into several sessions, tutorials and exhibits. It is addressed to all researchers and practitioners from the academia, the industry and the public sector, which are keen to be able to present their research work and innovation, so as to share with all participants of conference their experiences developed in this sector.

IT SOLUTIONS FOR PUBLIC TRASPORT
Where: Karlsruhe - Germany
When: 18 - 20 February 2014

SMART RAIL CONGRESS & EXPO
Where: Amsterdam - Holland
When: 24 – 26 February 2014

WORLD SMART ENERGY WEEK
Where: Tokyo - Japan
WHEN: 26 - 28 February 2014

2014 IEEE WORLD FORUM ON INTERNET OF THINGS
Where: Seoul – South Korea
When: 6 - 8 March 2014

INTERTRAFFIC
Where: Amsterdam – Holland
When: 25 - 28 March 2014

SMART GRIDS SUMMIT 2014
Where: NH Malaga - Spain
When: 29 - 30 April 2014

INTERNATIONAL SMART GRID CONGRESS AND EXHIBITION
Where: Istanbul - Turkey
When: 8 - 9 May 2014

WEB SITES

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http://www.ieee.org

http://sites.ieee.org/wf-iot/

http://www.intertraffic.com

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IMAGE SOURCE

The image of figure 1 is from: http://www.cisco.com/web/about/ac79/innov/IoE.html

AUTHORS PROFILES

LAURA RUSSO

Engineer, master's degree in Architecture and Building Engineering at the University of Naples Federico II with a thesis on urban expansion and the sprawl phenomena with a particular attention for Campania. In September 2012 she started to collaborate with TeMA-Lab.

FLORIANA ZUCARO

Engineer, Ph.D. student in Hydraulic, Transport and Territorial Systems Engineering at the University of Naples Federico II. Her research activity at the DICEA Department of the University of Naples Federico II is focused on the integration of land use planning, transport and energy saving policies and sustainable mobility in urban contests.

VALENTINA PINTO

Engineer, Ph.D. student in Hydraulic, Transport and Territorial Systems Engineering at the University of Naples Federico II. Her research activity at DICEA department of the University of Naples Federico II is aimed at studying the relation among city, mobility, and environment and consists in setting up a support tool for the public decision-maker in individuating the possible influences of the urban planning policies on mobility tools.

GENNARO ANGIELLO

Engineer, graduated in Hydraulic and Transportation Systems Engineering at the University of Naples Federico II. He is specialized in urban transport planning. He works as engineer in the field of civil networks and urban water infrastructure planning and management. In December 2012 he started collaborating with TeMA Lab.

GERARDO CARPENTIERI

Engineer, graduated in Environmental and Territorial Engineering at the University of Naples Federico II with a specialization in governance of urban and territorial transformations. Since 2011 he represents the UISP (Italian Union Sport for all) in the Forum Civinet Italy. In December 2012 he started collaborating with TeMA Lab.