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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.

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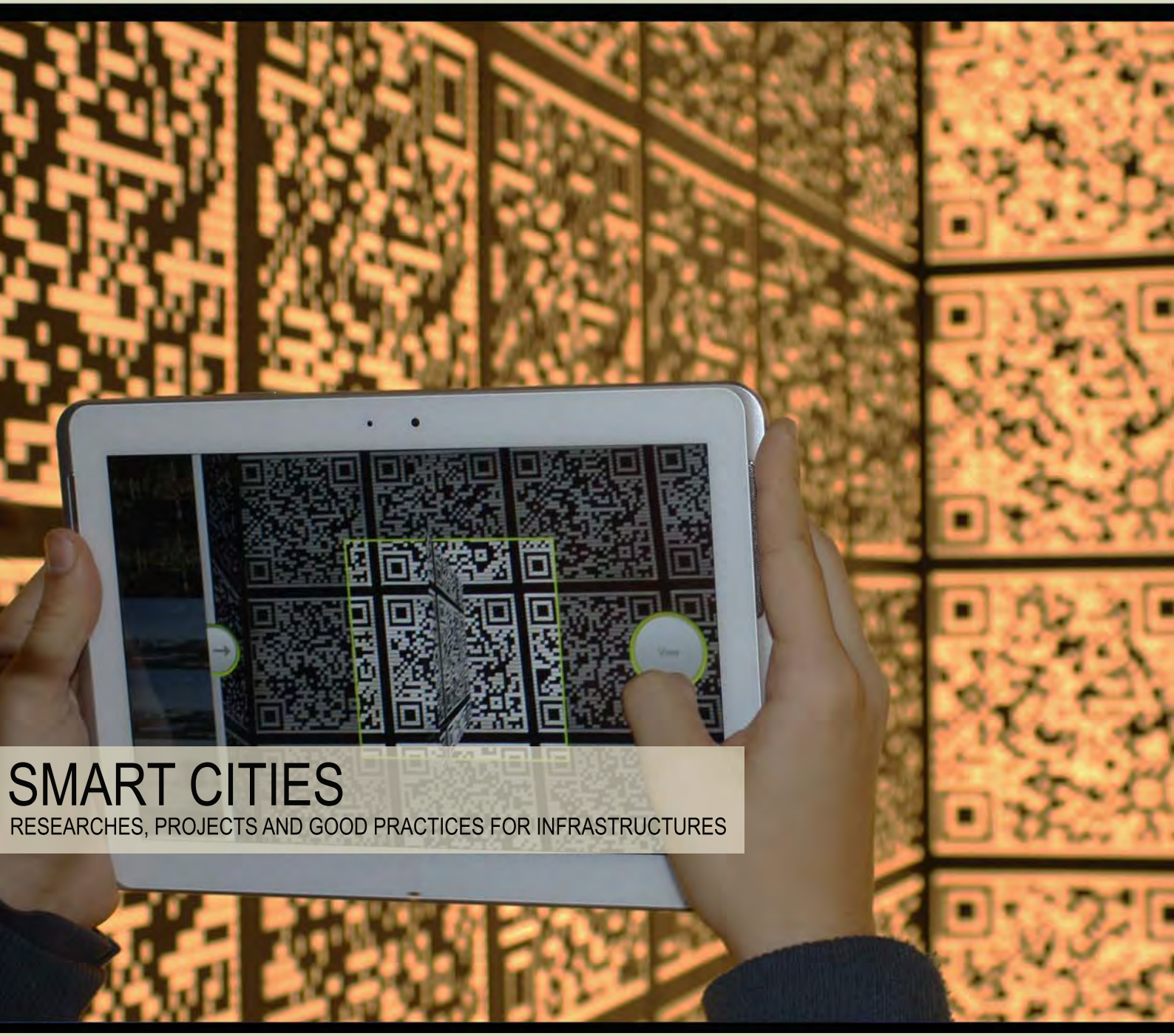

SMART CITIES

RESEARCHES, PROJECTS AND GOOD PRACTICES FOR INFRASTRUCTURES

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The volume n.6 of TeMA Journal of Land Use, Mobility and Environment deals with the topic of Smart City and this third issue deals in particular with the theme of Smart Urban Infrastructural systems. The main subjects that this issue point out are innovation of networks and infrastructural systems for people and goods mobility; advanced technologies of communication; intelligent systems for energy production and distribution; innovation in the production and management of water systems and disposal; early warning systems; monitoring systems for provision of real time information on different aspects of urban life (mobility, climate conditions, safety and so on). In this broader context one of the key theme is the role of ICT in innovating government and the policy decision processes: by enhancing the linkages between various governmental and social organizations, ICT supported knowledge flows (Socio Technical System) is a mean for sustaining innovation in the public sector since they enables governments to better cope with the uncertainties of a complex environment.

The first article of this issue is named “Collecting distributed knowledge for community’s smart changes” by Alessandro Sciullo and Sylvie Occelli. The article is an output of the MIDA project (Monitoring ICT Digital Divide in Asti) that has been carried out in Piedmont Region by the Asti Province government supported by the regional ICT observatory (PICTO). The project, taking inspiration from a crowdsourcing approach, involves citizens in the data collecting activity concerning broadband coverage, Internet access and usages. MIDA has been an opportunity to test the role of Internet as a dynamic collaborative environment in which diverse information, opinions, experiences collective benefits is likely to emerge from aggregated individual contributions, connecting statistically relevant data and interpreted information, thereby shaping a sort of collective learning process. The study suggests that local governments have a main role to play in prompting community transformation processes and to give local government information for policy interventions and to give citizens an opportunity to understand what the contents of the policy interventions are likely to be

about, thus representing an effort to establish relationships between inside and outside government and make the linking between government and governance more effective.

The second article by Giuseppe Mazzeo titled “City and energy infrastructure: a between economic processes and urban planning” analyses the relationships between energy, economy and urban planning, assuming the city as an intelligent system constantly evolving and as a system where economic processes come out at their highest level affecting other aspects of social and urban structure. The article analyzes the meaning of the intelligent city as an entity that is constantly changing and continuously adapting; another aspect studied is the role of the energy systems in the evolution of the activities and of the city’s image. Finally the paper investigates the role of the economic factors in the city evolution, pointing out that the way towards smart and green urban systems largely depend on their economic advantages.

The third article by Paola Pucci is titled “Mobile Phone Data and Mobility Policy” and it focuses on the potentialities offered by mobile phone data to provide useful knowledge of spatial practices and the use rhythms of the contemporary city, for more effective and equitable mobility policies. Starting from the results of a research carried out by the Politecnico di Milano, using mobile phone data provided by Telecom Italia and finalized to verify the meaning of mobile phone data in returning the density of land use and the origins and destinations of daily movements, the paper highlights how new maps, based on the processing of mobile phone data can exemplify spatialized urban activities and how they can give new insights for analyze space-time patterns of mobility practices.

The fourth article titled “Smart Mobility Opportunities and Conditions” by Luca Staricco, starts from the assumption that most of the opportunities of smart mobility are related to technological innovations for managing and organizing trips and traffic and for improving the environmental efficiency of vehicles; but the impacts of these innovations, in particular over the long term, depend on how they are embedded by the users in their daily activities and practices. These “boundary conditions” are often disregarded, just as they generally concern not a technological dimension, but the psychological-cognitive and socio-cultural domain.

The article analyzes the boundary conditions and the opportunities they can support and which risks can emerge if they are not fulfilled.

In the last article, titled “EU Smart City Governance” the authors Carmela Gargiulo, Valentina Pinto and Floriana Zucano analyse three documents of the European Commission (Cohesion Policy 2014-2020 of European Community, Digital Agenda for Europe and European Urban Agenda) describing the general contents of these policy documents, illustrating the scenarios for the future of the European cities according to them and tracing the evolution of the Smart Cities theme developed by these three instruments.

Finally the Review Pages define the general framework of the theme of Smart Cities Infrastructures and Network with an updated focus of websites, publications, laws, urban practices and news and events on this subject.

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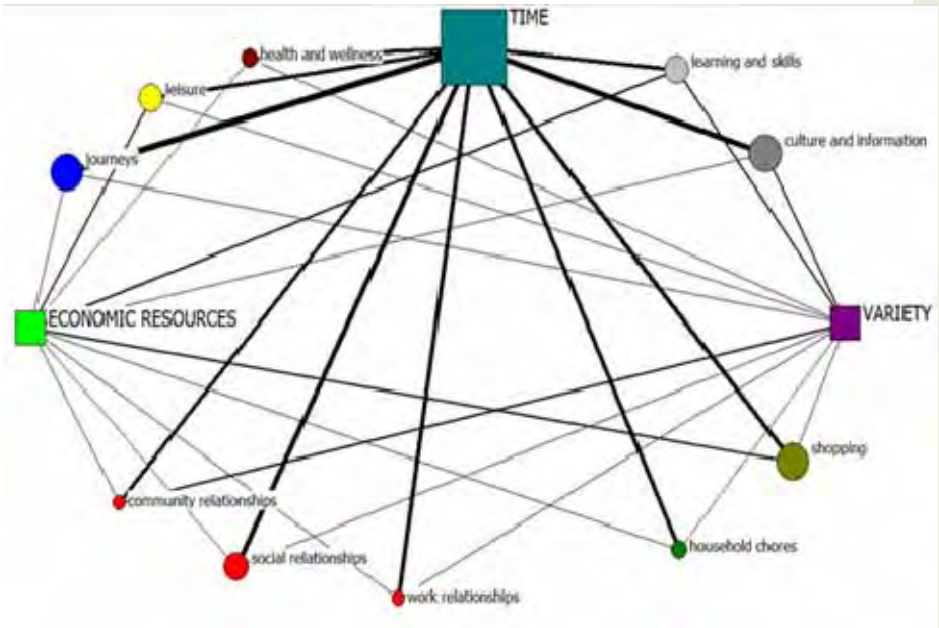

COLLECTING DISTRIBUTED KNOWLEDGE for COMMUNITY'S SMART CHANGES

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ABSTRACT

The paper deals with the role of ICT in innovating government's and the whole process of "policy production process".
By enhancing the connections between various governmental and social organizations, ICT supported knowledge flow s and the associated Socio Technical System may be a vehicle to support innovation in the public sector. In fact, they would enable governments to better cope with the uncertainties of a complex environment.
The MIDA Project carried out in the territory of Asti Province (Piedmont) can be considered as an attempt to engage in building such as a system.
The Project uses a crowd sourcing approach and it involves citizens in collecting data concerning broadband coverage, Internet access and usages.
From a research standpoint, MIDA represented an opportunity to test the role of Internet as a dynamic collaborative environment where statistically relevant data and interpreted information could be merged.
In terms of policy, the project stood as an opportunity for the local government to engage itself in a new policy approach to grasp people's needs and improve service delivery.

KEYWORDS:
policy innovation, socio technical system, crowd-sourcing, collective learning.

1 INTRODUCTION

1.1 BACKGROUND: PUBLIC SECTOR ON THE MOVE

This paper is concerned with ICT supported knowledge and its role to spur innovation in government and the whole policy production process. Lately a main shift has taken place in ICT government programs as these are evolving from being narrowly defined as a technology to enhance the efficiency of transactions through ICT applications, to a system approach facilitating the linkages between the various government departments and social organizations (Occelli, 2102a).

ICT supported knowledge flows accompanying and/or underlying these linkages (what in the literature has been popularized as Socio Technical Systems). Indeed, they have a foundational role in establishing (new) infrastructure for policy activity and service delivery. Moreover, they help achieving greater openness and transparency in the government transformations, while reinforcing resilience in the transformation processes (see Maier-Rabler and Huber, 2011, Davoudi, 2012). ICT supported knowledge flows (STS), in fact, are a main vehicle for empowering changes (sustaining innovation) in the public sector, while enabling government organizations to better cope with the uncertainties of a complex environment (see Nograsek, 2011, Witworth, 2009). Ultimately, they are a crucial determinant in establishing the smartness of today cities and local communities (IBM, 2013, Nim and Pardo, 2011).

1.2 THE STUDY CONTEXT AND MOTIVATIONS

The above arguments are also true for Piedmont, where since 2005 an observatory has been established, the Piedmont ICT Observatory (PICTO), with the aim to accompany and monitor the deployment of the 2005-2009 broadband programme in the region. As this came to a completion in 2010, a number of thorny questions became apparent, concerning the role of ICT in supporting the regional smart growth as required by the Europe 2020 strategy. Among them, how to properly leverage the cascade of changes produced by broadband/Internet and how to address the new types of digital divides likely to be caused by an increasing demand variety of higher performance broadband services.

It became apparent therefore that PICTO's earlier concern to provide a pertinent observation lens of ICT spreading in the region, needed to be extended to better account for the technology impacts as agents and organizations appropriate of ICT in social practices and transform their original functions.

In 2012, the collaboration with the Asti Province provided an opportunity to address some of these issues. Situated in the central hilly part of Piedmont, Asti is a relatively small area (220.000 inhabitants), mostly rural, where, in spite (or because) of forms of digital divides persisting, awareness over the potential of broadband has increased over time. To better target future ICT policy initiatives in the area, the local government decided to engage in what back then was unique experiment within the Italian context. With the scientific support of PICTO and the institutional endorsement of the R&D Department of the Piedmont Region, it launched a project (Monitoring Ict Digital Divide in Asti, the so called MIDA project) which directly involved citizens in the data collecting activity concerning broadband coverage, Internet access and usages.

Notwithstanding a shared interest by all supporters for testing in vivo an innovative approach, different objectives motivated the experiment:

a) an overarching policy goal to have more reliable (and geo-referenced) information about the quality of broadband services at municipal and sub-municipal level (as required by the European Digital Agenda);

b) a management purpose associated with the need to establish a platform for information exchange between citizens and governmental bodies allowing for quicker service delivery at sub-regional level (as hoped for by national e-government initiatives);

c) a research interest, stimulated mainly by the opportunity to explore a new type of approach for collecting information about ICT equipment and usage.

This paper gives an account of the main results of the MIDA project, focusing in particular on those more oriented at addressing some research issues which are also

- data vs. knowledge issue, that is the possibility to collect more relevant data, better understand the available ones, give meaning to them and use the more performing information for relevant action;
- involving recipients of a policy initiative at the early stage of a policy;
- investigating new kind of knowledge, and namely the possibility to connect quantitative and qualitative information.

To fulfil these purposes, the paper has been organised in four sections.

Section two gives an overview of the main challenges government organizations are confronted with for making their activities more open, efficient and effectives. In section three the context of the study is introduced and the Asti situation briefly outlined. Section four recalls the project design and discusses its main results. Finally, some general remarks and suggestions for future research are outlined in section five.

2. A CHANGING GOVERNMENT ENVIRONMENT

Notwithstanding considerable progress has been made over the last decade, the impact of ICT applications in policy practices has been limited or, at least, their results in terms of public service effectiveness and efficiency have not matched the expectations.

The reasons are manifold and can be attributed to various factors such as: i) the difficulties in keeping up with the rapid pace of technological improvements; ii) the lack of resources and competences to comply with ICT regulative frameworks; iii) the inertia in the overall government organization.

In Piedmont, some of these questions have been regularly investigated since 2005, when an observatory was established, the Piedmont ICT Observatory (PICTO), to accompany and monitor the deployment of the 2005-2009 broadband programme in the region.

When the programme came to a completion in 2010, a number of thorny questions arose.

First, as observed in other countries (see for example Centeno, van Revel and Burgleman, 2005, Navarra and Cornford, 2007) some shortcomings in the currently implemented approaches became apparent as most regional e-government programs turned out to be too narrowly conceived. Being mainly aimed at enhancing the efficiency of transactions through ICT applications, they paid little attention at the relational capability of ICT applications, i.e. how their usage could enhance the linking among the different government departments and between institutions and citizens. In addition, most of the programs proved unable to keep the pace with the technological advancement and exploit the potential of new applications, such as those based on web 2.0 and social networks.

Second, it was understood that fresh opportunities existed in the role ICT could play in supporting the regional/local growth paths as required by the Europe 2020 strategy, i.e. by properly leveraging the cascade of changes produced by broadband/Internet and addressing the new types of digital divides likely to be caused by an increasing demand of diverse and higher performance broadband services.

More generally, the questioning gives ground to the idea that in order to get full advantage of technology, government organizations have to re-mould themselves and namely to change their working while better

adapting to the context (see Australian Government Department of Innovation, Industry, Science and Research, 2011, OASIS, 2011, Occelli, 2012a, Scholl, 2003, Swederberg and Douglas, 2003). That is it is becoming increasingly apparent that (also) government organizations have to engage in a co-evolving process of mutual adaptation (see for example Middleton-Kelly, 2011, Gill-Garcia, 2012), whereby reflection about it is itself part of the process (Occelli, 2006, 2008).

In Piedmont as well as in Italy, the issue has been generally overlooked as other questions related to the efficiency of public administration, the steady reduction in public funding and the viscosity of inter-institutional relationships were considered as more prominent.

Indeed, considering innovation as a way to empower changes has never been a main concern in the public sector (see NESTA, 2008), mainly because: a. the fact that in the public sector most transformations are imposed by legislation or political changes, b. the weakness of ecological forces of competition and the risky aversion attitude in the public sector and c. the difficulty to have clear indications of the benefits yielded by the outcomes of the programs, in term of public value.

The mandatory nature of many e-government initiatives, is also a major explanation for the ICT diffusion trend observed in the local authorities of Piedmont, where progress in the last decade has taken place with boots and straps according to legislation (see PICTO, 2012).

Recently, some weak signals revealed by PICTO findings suggest that new possibilities may exist. As the socio technical infrastructure implemented by the regional broadband program consolidates and more open and transparent government websites are created, new opportunities exist for (ICT based) information delivery and creation. Indeed, they can support more comprehensive, robust, and socially oriented e-government programs. Information about the whole as well as the different components of service production process turns out to be one of the main drives for innovative changes in government organizations to take place. It is an essential ingredient for achieving cost effectiveness, and, up to a certain point, to increase variety in the service bundles and their delivery alternatives.

As widely documented in the literature (see Berra, 2007, Castells, 2004, van Dijk and Winters-van Beek, 2009, Wellman, 2003, Whitworth, 2009) ICT networks are crucial enablers for these processes because: a) they facilitate the valuable connection between the internal and external observation lens of the different actors involved in government programs, b) they facilitate the inclusion of service users as a main information source in reference to the service performance and expectation and c) they make it possible to create (adapt) new so-called Socio Technical Systems, through which those programs are implemented in situated context.

3. THE PIEDMONT REGIONAL CONTEXT AND THE ASTI PROVINCE

3.1 ICT PENETRATION IN THE REGION

With the completion of the five-year regional broadband programme in 2010 the skeleton of a region wide socio technical infrastructure was established in Piedmont. Its impact on the penetration of the Internet and web related services has been noticeable, although the development of e-government services depended very much on the evolution of the national agenda and were led by the Italian public administration laws.

To date, almost all municipalities and government offices in the region are now equipped with the basic ICT infrastructures and services (broadband, certified e-mail, digital signature and institutional websites). The interactivity level of online services, however, is still low and limited to the provision of fill-in forms to prompt administrative procedures. The most widespread online service is population registry self-certification,

followed by property tax payment, which is also the most widely available among the transactional services. ICT presence is the highest in core administrative back office services, such as taxes, demographics and financial services. These services are often managed inside the administration (CRC-PICTO, 2012).

One municipality out of four perceives ICT equipment cost as the main barrier to ICT penetration in the organization, Fig.1.

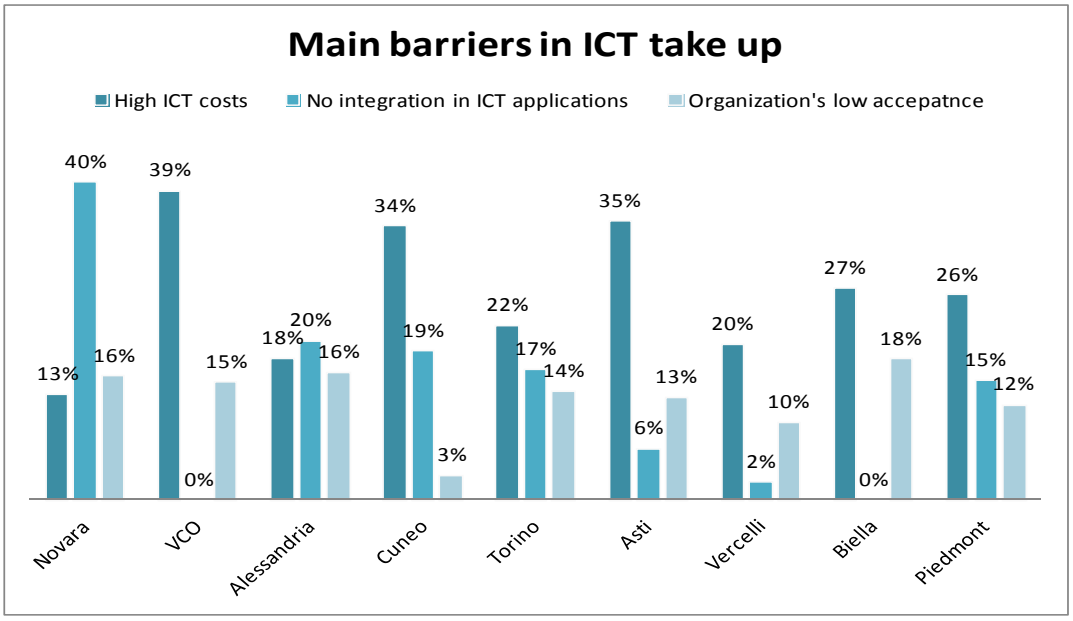


Figure 1 Main barriers in ICT take up by municipalities in Piedmont province, 2011

Additional difficulties emerge in the low capability to exploit, or at least to properly handle, the cascade of changes produced by the ICT usages.

In 2011, the PICTO survey on ICT diffusion among local authorities investigated some of these aspects[1] and reported on:

the front-office oriented action domains, such as better understanding the users' needs, improving the quality of service and promoting new functionalities in service delivery;

the back-office oriented changes, meant at improving service accessibility interoperability and personnel's ICT skills and competence, simplifying access procedures and norm revision.

Results show that, so far, awareness by local authorities on the possibilities offered by ICT to design service upgrading and/or upgrade existing functionalities is still low.

[1] A sample of 189 municipalities, out of 1206, were surveyed. The questionnaire investigated all the back office activities and for some of them assessed some main underlying dimensions, such as costs, skills of the employees, quality of services, functionality, etc.(see, PICTO-CRC, 2012).

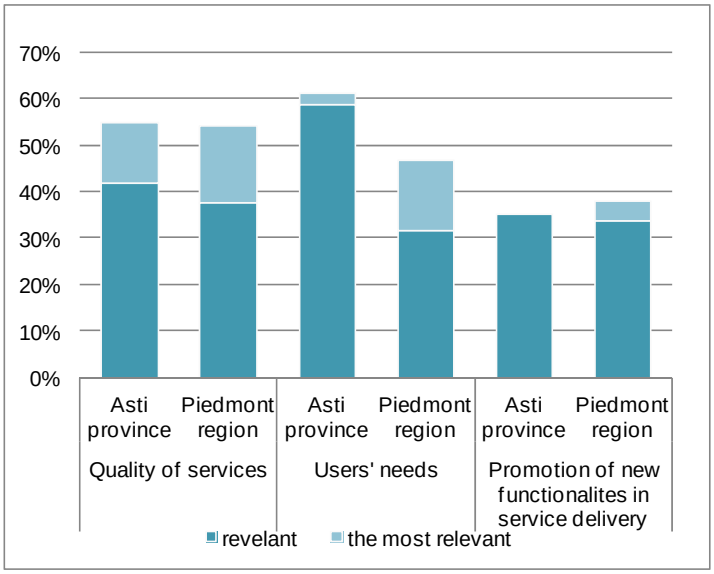


Figure 2 Main action domains for improving online service for citizens by municipalities in the Piedmont region and Asti province, 2011

As for the action domains, only half of the municipalities considered the quality of service and users' needs as important (or the most important) domains for action, Fig.2. Compared with the regional profile, the Asti province showed a greater concern for having better insights into users' need.

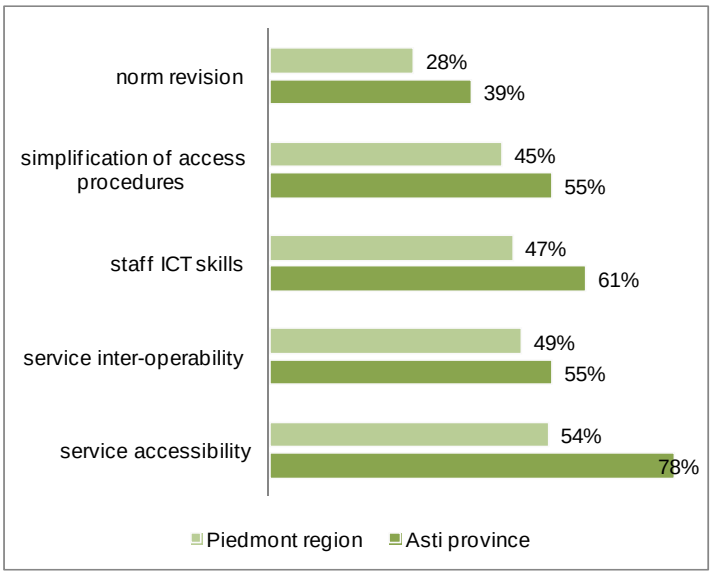


Figure 3 Main target areas for improving online service for citizens, by the Piedmont region and Asti province

Requirements for back-office changes were however more evident.

About half of the municipalities reported that the majority of the existing services needed to be improved, Fig.3.

In particular, service accessibility and inter-operability were identified as a main area of improvement, whereas revision of norms and regulation were regarded as the least important.
As shown in Fig. 3, with respect to these aspects, the Asti province showed a relatively higher sensitivity than the region as a whole.

4. ENGAGING CITIZENS IN KNOWLEDGE BUILDING IN THE ASTI PROVINCE

4.1 THE PROJECT DESIGN

It is against this background that, in order to better assess broadband needs in the area, the local government decided to launch the MIDA (Monitoring Ict Divide Asti) Project .
Taking inspiration from a crowdsourcing approach (see, Goodchild 2007), the population of Asti aged between 15 and 74 was invited to participate to a wide information gathering activity to assess the quality of their broadband connections and investigate their *daily practices* in ICT usages. People were asked:
to send via mobile phone SMS, geo-referenced information about the quality of home/places broadband access;
to answer a web questionnaire investigating the availability of broadband services and Internet utilizations. Designed according to the data collection protocol and used for implementing the EU Digital Agenda Indicators, the questionnaire also tries to elucidate the perceptions of the benefits obtained by individuals in using ~~the~~ Internet in their daily practices. As the nature of internet use has changed over time, the question wording was meant to reflect new behaviours;
to tell the story of what they consider as their most positive Internet experience.
Launched in mid September 2012, the data gathering campaign lasted about one month and a half and had ended by October. Real time information about the data gathering progress was provided by the Asti Province website, Fig.4.

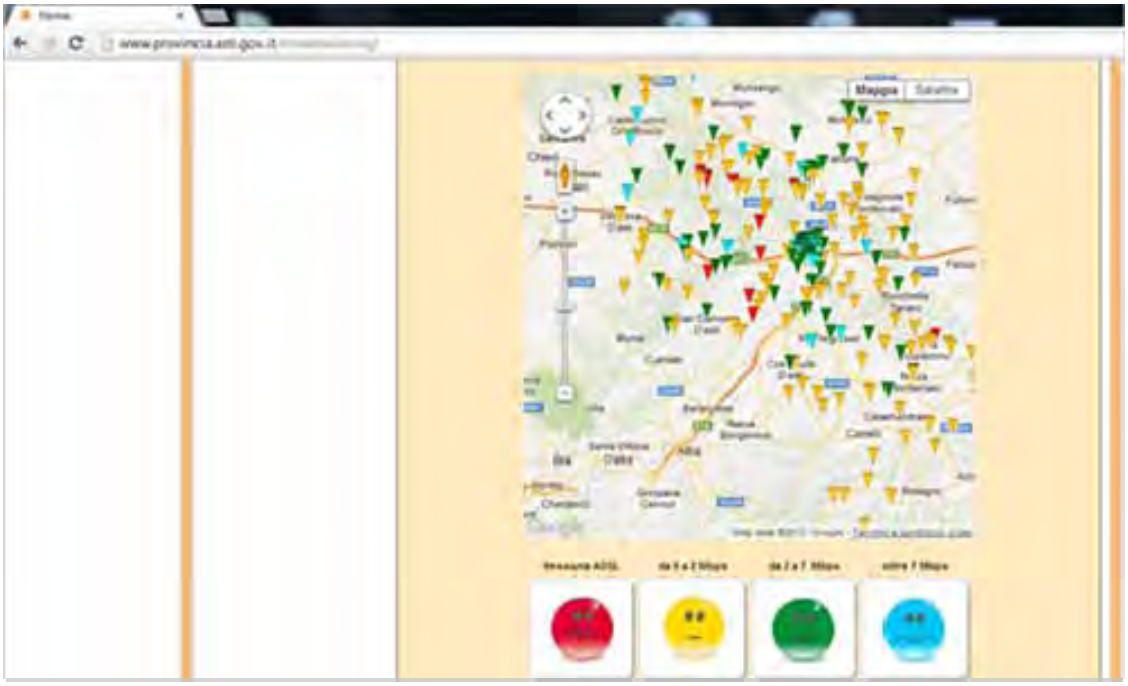


Figure 4 The MIDA webpage with the results of the data gathering activity during the survey

3.2 THE PROJECT RESULTS

Notwithstanding the efforts made by the Asti province to promote the initiative through the local media and schools, the participation to the project was below expectations. Only three hundred and a half people sent the information about the broadband access. Two out of three also answered to the online questionnaire. Very few offered their successful stories about using Internet.

The reasons of this low participation are manifold, but can be justified according to the following explanations.

The first has to do with the general climate of uncertainty, which because of the turmoil in the economy, in Piedmont as in rest of the country, is affecting most of the social practices. This situation did not allow for an innovative project such as MIDA to catalyse the citizens' interest. Indeed, as reliability in governmental action has been progressively declining over the last months, the project was unable to be regarded as attractive by citizens.

A second explanation has to do with the fact that the enthusiasm and expectations of the promoters for this kind of initiative were most likely too high compared with the real interests of people. To some extent, this also suggests that there is a sort of dis-alignment between how experts interpret e-government problems/solutions and how people perceive using e-government services.

Finally, the existence of inertia and/or socio-cultural barriers to change is an additional factor, which was probably underestimated, and might have prevented people' participation.

A partial support to this explanation is offered by the results of the ICT diffusion survey carried out by the Italian National Bureau of Statistics in 2011, Fig.5. This last shows that, compared with other Italian regions, Piedmont is not among those most advanced in using ICT for communication and e-government.

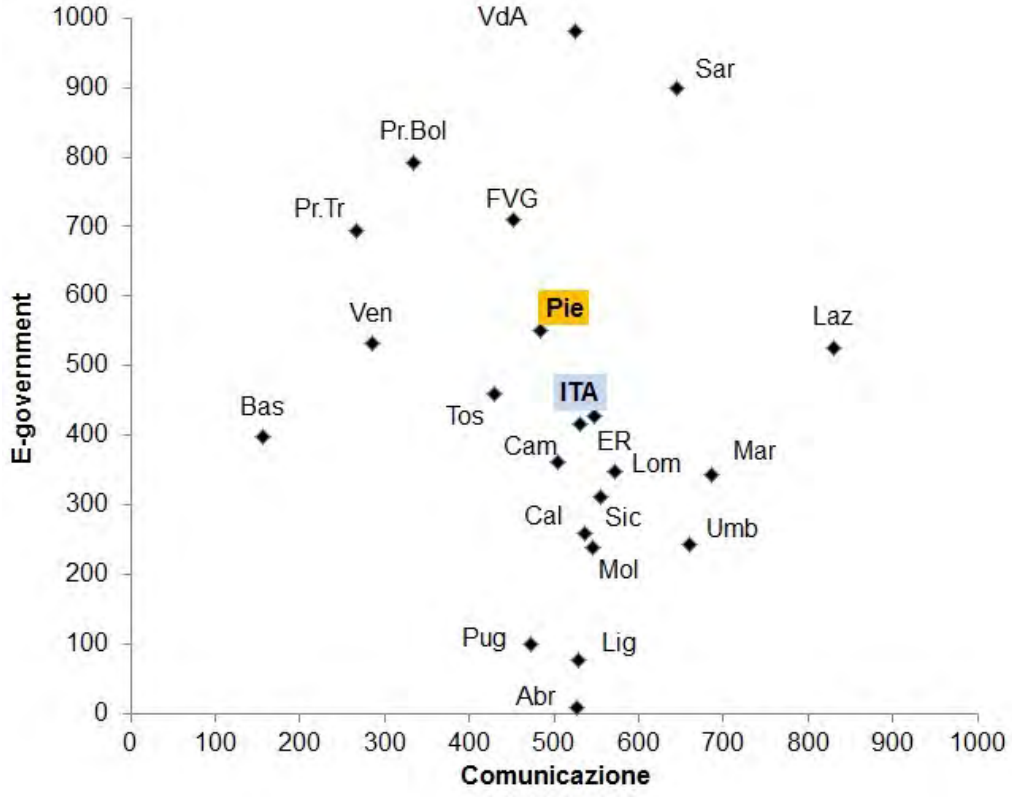


Figure 5 A joint analysis of ICT for communicating and using e-government services by citizens in Italian regions, 2011 (*)

(*) Averages values of normalised elementary indicators (see PICTO, 2013, chapter 4)

Not unexpectedly, the MIDA respondent profile is only partially representative of the resident population. A larger majority made of young (one out five was 20 year old) and adult population (about 30% was aged between 40-50). 80% of respondents belonged to households with a low or medium income; households with 3 or more components were over represented (80%). One respondent out of four had a high education level, and this proportion was significantly larger compared with the average in the area. Students accounted for 23% of the respondents, and 60% were employees mostly in clerical professions.

On the whole, the respondent profile reveals features generally associated with a certain propensity to adopt ICT and engage in their use. Actually, almost all the respondents to the MIDA questionnaire were Internet users.

In the following, attention is focused on the profile of Internet utilizations on the perception of the benefits accrued to individuals in using the web in their daily practices.

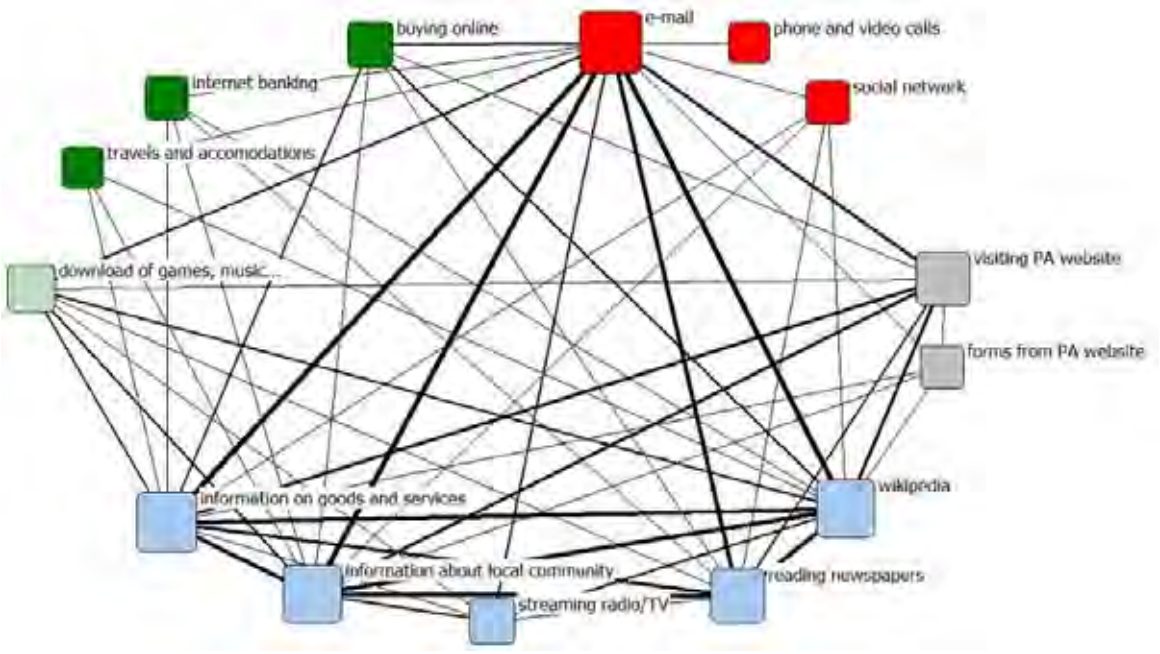
Table 1 shows the list of Internet uses, which have been investigated in the MIDA project. It also provides a measure of the relative importance of each usage (degree) which results from an application of a Social Network Analysis meant to analyse the connections among the different usages.

Fig.6 graphically shows the network of the overall connections. Not unexpectedly, e-mail and online payment to PA are the most and least popular utilization of the web, respectively. The former, in particular, is more strongly connected with the search of information (about goods, service and local community) the use of Wikipedia and the access to online newspaper.

A high connectivity is also exposed between visiting PA websites and using the web for information search.

Rank	Internet usage	Degree	Rank	Use	Degree
1	e-mail	59,5	13	forms from PA site	39,7
2	Wikipedia	58,0	14	phone and video calls	39,5
3	information about local community	57,3	15	upload of texts, pictures	39,1
4	Information about goods and services	57,2	16	Forum	34,7
5	reading newspapers	54,8	17	selling online	26,8
6	visiting PA website	50,6	18	sending filled forms to PA site	23,5
7	download of games, music	47,6	19	gaming online	23,3
8	buying online	46,8	20	creation of websites and blog	19,9
9	streaming radio/TV	45,6	21	adding contents in wiki-like sites	19,4
10	social network	43,5	22	job searching	15,9
11	Internet banking	43,3	23	E-learning	15,8
12	travels and accommodations	41,1	24	payment online to PA	13,3

Table 1 List of Internet usages by relative importance within the network of Internet usages for the MIDA respondents (*)
(*) The degree value is normalised according to the tie maximum value.



Tie statistics: min 8; max 157; average (density) 59,9; standard deviation 35,2

Figure 6 Network of Internet usages for the MIDA respondents (*)
(*) Only ties above the average plus ½ standard deviation are shown.

To investigate the benefits of using Internet, it was asked to citizens to choose whether in undertaking their social practices, the positive impact in using the web was a result of: a) relaxed time constraints (time saving), b) reduced costs of carrying out an activity (economic resources) or c) access to a wider range of alternatives in carrying out a certain activity (variety of alternatives).

For more than 60% of the respondents, the most significant impact was felt with regard to time savings, while the other two constraints accounted for about a similar share (20%). Overall, this impact was relatively more important for adults (between 50 and 60 years).

The graph of Fig.7 details the results by social practices. It shows that time savings (TIME) has had a positive impact above all on journeys and socio-cultural activities. Not unexpectedly, shopping and learning activities are relatively more sensitive to a greater availability of economic resources (ECONOMIC RESOURCES).

Having the opportunity to access a greater variety of alternatives (VARIETY) is perceived to have a relatively higher positive impact on the relationships with the local community.

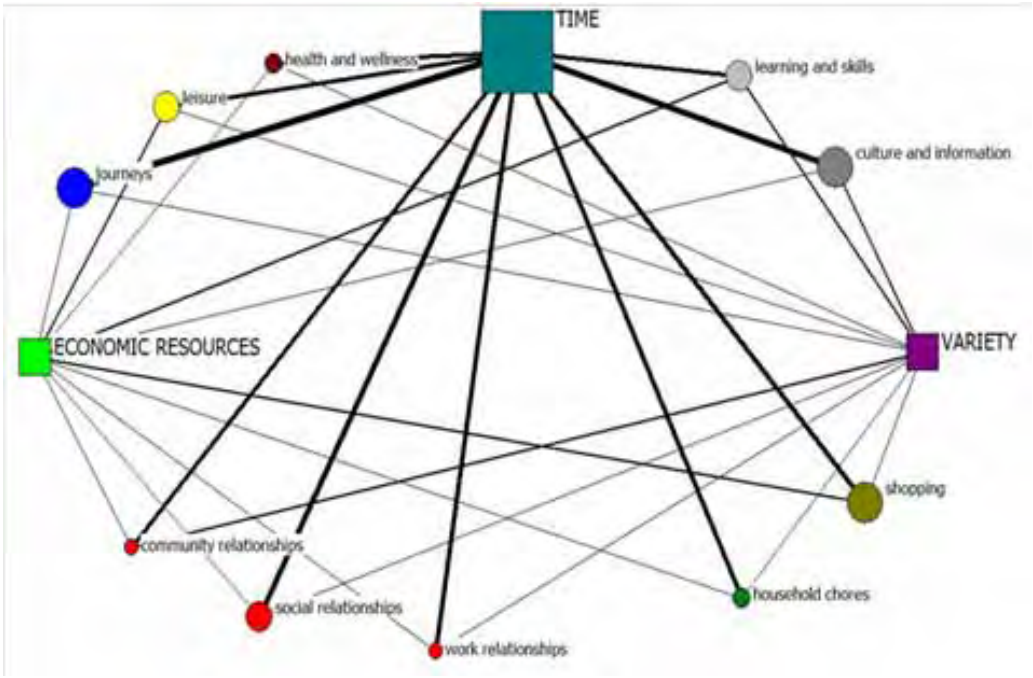


Figure 7 Perceived benefits of Internet usages in relaxing time and cost constraints and in increasing alternative variety, in carrying out (a set of) social practices for the MIDA respondents

The MIDA questionnaire gave also the possibility to probe into a domain never addressed in earlier PICTO surveys, concerning the relationships between patterns of Internet usages, such as those described in Fig. 6, and the perceived benefits of these usages, as revealed by Fig.7.

To address the issue, a cluster analysis was carried out considering the whole set of Internet usages (see Tab.1) which identified 4 groups of Internet users, whose profile is described in Tab.2 and Fig.8.

On the whole, the results give support to well known findings about the existence of positive relationships between certain socio-demographic features (such as high education level, younger age, and larger household size) and higher rates in the utilization of Internet services. This is clearly apparent in Cluster 1 and 2 which account for the respondent groups where Internet utilization is more widespread. The former consists of a relatively larger share of younger population. The latter concentrates the larger majority of individuals who use e-government services.

The other groups concentrate on individuals who have a lower familiarity with the web. Interestingly in cluster 3 women and men are more equally distributed; the age profile is polarized towards the young and older age brackets. Cluster 4 has the lowest percentage of graduates and the highest share of retired people.

	Gender		Age groups						Occupational Status			Large household	Graduate
	F	M	< 20	20-29	30-39	40-49	50-59	>= 60	employed	student	retired		
Cl_1	10%	90%	13%	43%	33%	10%	0%	0%	57%	37%	0%	53%	40%
Cl_2	29%	71%	12%	7%	31%	24%	21%	5%	76%	17%	5%	41%	33%
Cl_3	50%	50%	24	6%	16%	29%	16%	8%	53%	24%	6%	39%	22%
Cl_4	39%	61%	11%	11%	11%	36%	25%	7%	68%	18%	11%	46%	14%
Total	34%	66%	16%	15%	23%	25%	16%	5%	63%	23%	5%	44%	28%

Table 2 Socio-demographic profile of MIDA respondent groups

A comparison of the profile of Internet usages across the clusters, Fig. 8, suggests that MIDA respondents can be distinguished in two larger population groups accounting for a similar share of individuals: a group where the propensity to use the web for information and e-government is more widespread (Cluster 1 and 2) and a group where the appropriation of the Internet is relatively lower (Cluster 3 and 4).

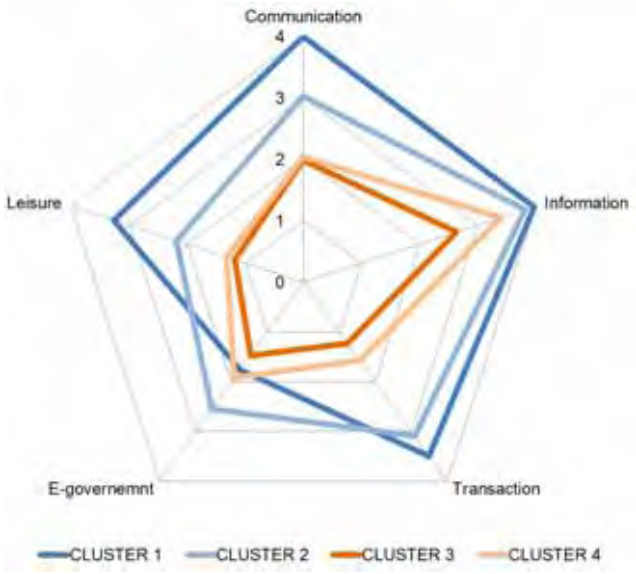


Figure 8 Profiles of Internet usages in groups of MIDA respondents

Note : Figure 8 presents average (range 0-4) of the following Internet usages:
COMMUNICATION: e-mail, phone and video calls, social network, forum.
INFORMATION: reading newspapers, search for information on goods and services, search for information about local community, streaming radio/TV.
TRANSACTION: buying online, reservation of travels and accommodations, selling online, Internet banking.
E-GOVERNMENT: visiting PA website, download of forms from PA website, sending filled forms to PA, payment online to PA.
LEISURE: download of games, images, music, movies, gaming online, upload of texts/ pictures/music/video, uploading contents into wiki-like websites

Not unexpectedly, the advantages resulting from Internet utilization are not uniform across the different population groups, Fig.9. Although the benefits of time savings are those most widely perceived in all

groups, those depending on the possibility to access a wider set of alternatives are more apparent in Cluster 1, which concentrates individuals with a higher propensity to exploit the web.
Economic benefits are more appreciated by the individuals in Cluster 3.

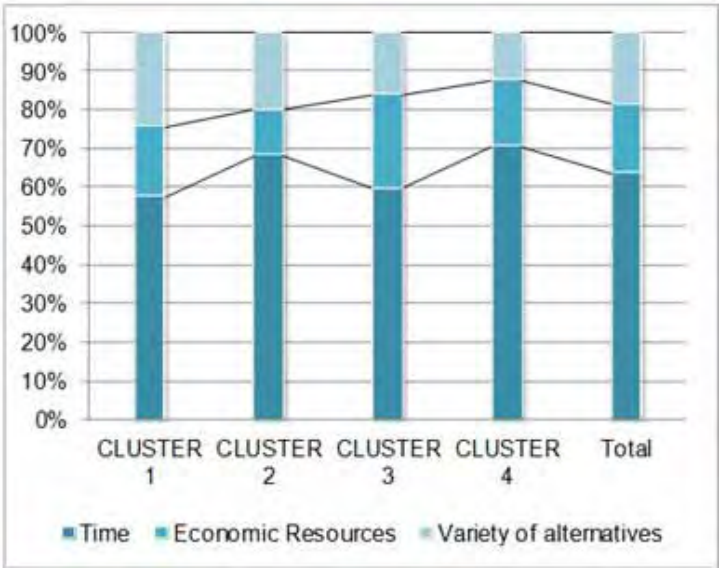


Figure 9 Perceived benefits of Internet usages on relaxing time and cost constraints and on increasing alternative variety in the groups of MIDA respondents

When analyzing the time benefits accrued to the different social practices, some further differences can be detected across the groups, Fig. 10.
For respondents in Cluster 1, shopping, leisure and household chores are the social practices, which most take advantage from time savings. Reducing travel time in daily journeys is a benefit widely perceived by all the other clusters.
Time savings in accessing cultural activities and information is particularly appreciated by people in Cluster 4.

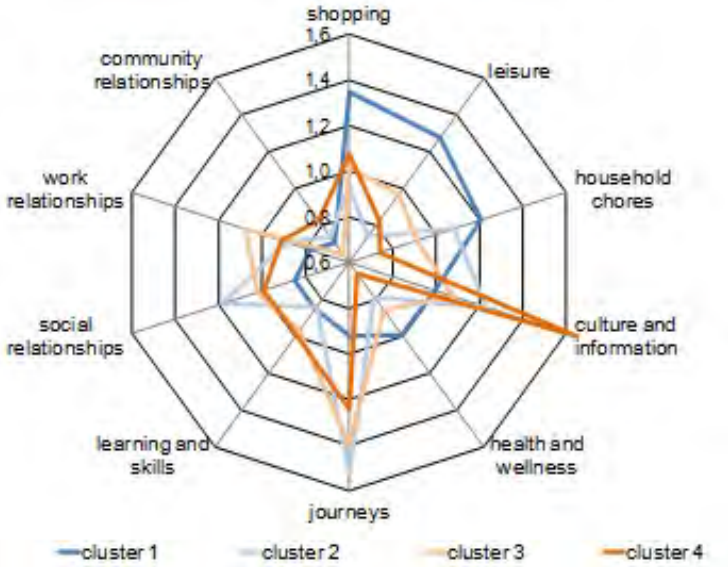


Figure 10 Perceptions of time savings for the social practices, within the groups of MIDA respondents (*)
(*) Index values are computed as the ratio between the percentages of the answers "yes to time benefit" for each activity and the total share of these yes answers in each cluster.

The results of this study support the claim that the more people use the Internet, the wider the benefits accrued to them in their social practices. Although this is not unexpected on a conceptual ground, the MIDA project gave the opportunity, at least for the Piedmont region, to support it on an empirical basis.
An additional aspect is gauged by the benefit profile observed in Cluster 1 (see Fig. 9), where Internet utilization is more widespread. As in the other clusters, it points out that by reducing economic costs and time constraints, Internet usages can help people to engage in their daily practices more efficiently and effectively.
Furthermore, it also suggests that by providing access to a wider range of alternatives, Internet usages are also a way for empowering individuals in their undertaking, i.e. helping them to establish new patterns of relationships (Quitney Anderson and Rainie, 2010) and new types of socio technical systems which on their turn make it possible to engage into social practices in novel ways (Whitworth and Witworth, 2010).

5. CONCLUDING REMARKS

This study gives evidence that a local government has a main role to play in prompting community transformation processes, and engage in smart community building (Nam and Pardo, 2012). Involving citizens in providing information/perceptions about their digital divides and Internet usages has a twofold advantage. It gives local government more detailed information in order to better and timely tailor policy interventions and it gives citizens an opportunity to understand what the contents of the policy interventions are likely to be about. Whenever the knowledge flows can be maintained and nurtured over time, a collective learning process may take place and help guiding the community's transformation processes.
The MIDA project carried out in Piedmont region has been an attempt to address the issue by directly involving citizens in gathering data and creating more significant information for steering e-government policy.
Although not wholly successful in terms of participation, the project had a number of positive outcomes.
First, it has been an opportunity to test the role of Internet as a dynamic collaborative environment in which diverse information, opinions, experiences, and skills can be grouped to provide substantial resources, in contrast to the currently used static information delivery platform Goodchild, 2007, Flanagin and Metzger, 2008). As widely emphasized in the new Socio Technical System literature, the essential premise is that given efficient means of information sharing and participation, collective benefits is likely to emerge from aggregated individual contributions (Berra, 2007, McIntyire, 2003, Wellman, Quan-Haase, Boase and Chen, 2003,Whitworth and Whitworh, 2010, Occelli, 2012b).
Second, by giving the possibility to connect statistically relevant data and interpreted information, the approach underlying MIDA project paves the ways to the production of enriched, and more *sensible* information. For PICTO, the project has been an opportunity for testing an information tool to implement such an approach. The web page created by the province administration to show in real time some results of the experience (see Fig.4) has been an effort in the direction: it shortened the *time to the public* (the final users) of the products of the data gathering process.
Finally, in terms of implications of the MIDA experience for policy innovation, two aspects can be mentioned which will deserve further attention in future research. The first one is that the involvement of citizens in providing information/perceptions about their (digital) needs gives local governments unprecedented possibilities to improve service delivery and tailor more timely policy interventions. This however requires to enhance the ability of government in managing information and communication, whereby both implies better technical competence and an increased attention at the quality of citizen-government relationships. For

citizens, moreover, their direct involvement by government gives them an opportunity to grasp what the contents of the policy interventions are likely to be about. The positive outcome of the latter, however, crucially depends on the people's willingness to participate. With regard to this the MIDA project was not fully successful. The experience gained however suggests that deeper attention should be paid to how better align the understanding experts and decision-makers have about e-government problems/solutions and the views people build up from their perceptions about using e-government services. This calls for a more comprehensive approach to e-government processes, where the scientific, technological, institutional and social dimensions could be integrated (Gil-Garcia, 2012, Inguaggiato and Occelli, 2012, Rhodes, Murphy, Muir and Murray, 2011).

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IMAGES SOURCES

Figg. 1,2,3: Piedmont ICT Observatory

Fig. 4 : MIDA Project website

Fig. 5: developed by PICTO on ISTAT data

Fig. 6,7,8,9,10 : results of MIDA project

TABLE SOURCES

Table 1,2 : results of MIDA project

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She holds a laurea in Architecture and Regional Planning. In 1987 she joined started working for the Institute for of the Socio-Economic Research Institute of Piedmont and she is currently leading a research unit aimed at fostering innovation in public administrations. She has published in various fields of regional science, ranging from housing, transportation, mobility urban modeling and spatial analysis. Current research interests include: road safety policy, ICT and regional development and the role of model-based activity as a way to support modernization in policy practices.

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CITY AND ENERGY INFRASTRUCTURES BETWEEN ECONOMIC PROCESSES AND URBAN PLANNING

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ABSTRACT

The paper deals with the issues related to the relationship between city, energy, economic factors and city planning. These issues are analyzed from a theoretical point of view and are placed in a logical path based on three assumptions. The first considers the city as an intelligent system constantly evolving. The second considers the city as a system where economic processes come out at their highest level affecting other aspects of social and urban structure. The third considers the planning as the weak link in the process of urban development, one of the most exposed to economic and social pressures.

Energy production has experienced a great progress since steam and electricity were discovered. Each stage of this evolution has affected city and territory introducing significant physical signs, changing the ways of carrying out functions and creating new needs and new activities. The energy revolution, based on sustainable sources and on skillful management of the networks, will strongly affect the city and the way of organizing the activities, their location, dimension, and the shape of the spaces.

The paper explores some of the issues related to the relationship between urban system and energy.

The first section analyzes the meaning of the intelligent city as an entity that is constantly changing and constantly adapting. The second section analyzes the role of the energy systems in the evolution of the activities and of the city's image. The last section investigates the role of the economic factors in the evolution of the shape and meaning of city, pointing out that the way towards smart and green urban systems will largely depend on their economic advantage.

KEYWORDS:
City, Energy infrastructures, Economic factors, Urban planning

1 PAPER FRAMEWORK

The paper deals with the issues related to the relationship between city, energy, economic factors and city planning. These issues are analyzed from a theoretical point of view and are placed in a logical path based on three assumptions. The first considers the city as an intelligent system constantly evolving. The second considers the city as a system where economic processes come out at their highest level affecting other aspects of social and urban structure. The third considers the planning as the weak link in the process of urban development, one of the most exposed to economic and social pressures.

Energy, with its meanings and its implications, is used as the Ariadne's thread of the following analysis.

Energy production has experienced a great progress since steam and electricity were discovered. Each stage of this evolution has affected city and territory introducing significant physical signs, changing the ways of carrying out functions and creating new needs and new activities. From the night-light that has illuminated the cities to the factories that have blackened them, from the vehicles that have developed the communications to the traffic jams that have slowed down the cities, there are so many direct consequences related to the progress of the energy system.

The same energy revolution, based on sustainable sources and on skillful management of the networks, will strongly affect the city and the way of organizing the activities, their location, dimension, and the shape of the spaces.

This scenario is based on the observation of the city as intelligent system able to adapt to changes of all kinds, especially of economic and social nature. In this scenario the planning takes part only later, by regulating processes already under way.

The paper explores some of the issues related to the relationship between urban system and energy, focusing its attention on the city meant as intelligent system and on the energy meant as the engine of this system.

The first section analyzes the meaning of the intelligent city as an entity that is constantly changing and constantly adapting. The second section analyzes the role of the energy systems in the evolution of the activities and of the city's image. The last section investigates the role of the economic factors in the evolution of the shape and meaning of city, pointing out that the way towards smart and green urban systems will largely depend on their economic advantage.

2 THE CITY IS ALWAYS INTELLIGENT

A city is a physical, spatial structure. But its shape is not sufficient to describe the city, because it shows multidimensional characteristics, such as ecology, culture, technology, economy, society and other (Castells 1989, Hall 1998). The city as "system" was conceived more than 50 years ago: a group of elements that operate as a closer entity, on which planning exerts its command and control prompts (Berry 1964, Batty 2011). The city as complex system has been the next step, with the assumption that it does not automatically return to balance after a perturbation, like a simple system.

The transition from simple to complex system represents the passage from the city seen as machine towards to the city seen as an organism, with a biological transformation of the system based on a loop model instead of a linear model. The meaning is that the city does not work by means of input-output actions. The next step considers the city as «'complex adaptive systems' in which cities exhibit properties such as non-linear cause and effect relationships» (Eames, Dixon, May, Hunt 2013), with permeable boundaries allowing the passage of energy and of other vital elements (Rotmans 2006).

The above assumptions leads to suppose that the city is an intelligent structure (Lévy 1996), and that its intelligence should be assessed in an historical perspective and linked to the social, economic and political period under analysis.

The intelligence of the urban structures is a direct consequence of the city meant as holistic system (Cheli 2010). Generally speaking, the social systems are not the mere collection of individuals, but have holistic characters that make the molded organism more complex (Dubeski 2001). Applying the Durkheim's statement to the urban systems it is possible to state that the character called "intelligence" is one of the factors that goes over the simple sum of functions and activities contained in a city. The organizational level reached by the social capital, as defined by Putnam, adds to this system further weight and meanings (Trigilia 1999).

The urban systems, then, are more significant than the sum of their elements. The Roman city was intelligent for its historical moment, also because it was built by people endowed with great pragmatism and determination. The Italian Renaissance city was an example of great intelligence also because it was based on a strong concentration of wealth and on a steady cultural foundations. At the end of eighteenth century London and Paris were intelligent and changed the type on intelligence when, a few decades later, they were equipped with modern infrastructure such as aqueducts, sewers, subways. So they became worldwide economic and political capitols tanks to very determined and organized expansion's policies.

Fig. 1 – Interior of Cristal Palace, London, where in 1851 was held the Great Exibition

It follows that every city is intelligent, or rather it is intelligent in a different manner, in relation to the historical period we analyze.

If we look at the different stages of a city's evolution without considering an historical perspective, all the cities of the past seem unintelligent. Actually this view is wrong and leads to the significant logical error to consider the urban evolution as a random aggregative process, and not as the result of economic, social,

political, and thinking forces which act regularly on it and create communities that represent the highest level of civilization in a particular period.

Moreover, the city shows its intelligence favoring or penalizing the specific actions that the urban subjects have started. Not all the possible actions are also practicable and not all the activities carried out are concluded because, at that time, they may be neither feasible nor are necessary.

Actions, finally, need to be contextualized. Even if they can be categorized and typed, the ways in which they are carried out and their results are not necessarily are the same in different places. For example, the "western route to the urban transformation" affects urban areas through actions targeted to balance the current malfunctions, directing the cities to sustainability tracks. In this perspective the consumption of new soil is seen as a negative factor, while to act on the built city is a method of action that, if made in the right way, increases the urban resilience (Moccia 2013), reducing its environmental loads.

In newly developing country the situation is completely different. In fact, while they set up expensive initiatives targeted to carry out showcase-projects on sustainable urban systems, the simple transformation of the existing city still goes on as well as its expansion in an uncontrolled way, with a scarce – or completely absent – attention to the sustainability.

3 A NEW KIND OF INTELLIGENCE

The need to build urban systems with high sustainability and increasing resilience has had as crucial after-effect the diffusion of a specific meaning of the idea of intelligence. This meaning adds to the intrinsic intelligence of the cities a more material connotation. A universe of sensors and machines able to manage and optimize all the activities carried out by human beings, but also able to allow a potentially total control on people and on their freedom of action (Longo 2013).

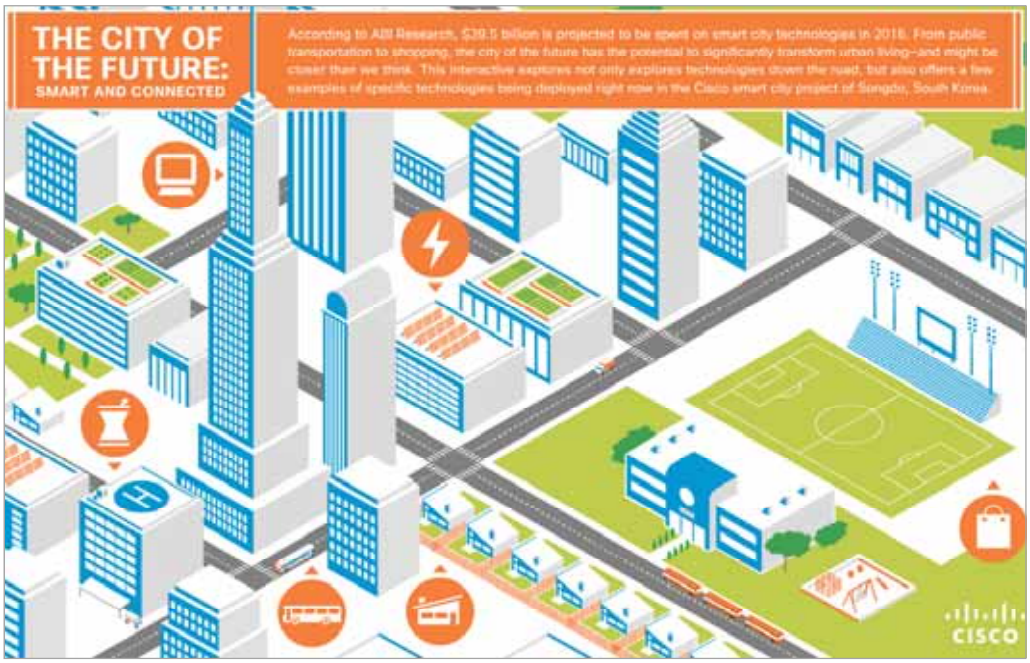

Fig. 2 – Cisco smart city project of Songdo, South Corea

A critical dimension of the cities is the growing supply of services, based on advanced and smart technologies meant «to integrate smartness in the infrastructure of the city so as to extend the effectiveness of the services at a lower cost» (Berthon, Guittat 2011).

The integration of infrastructural systems leads to the creation of an "intelligent infrastructure", able to handle large amounts of data, analyzing the trends, and acting accordingly by changing the service delivery.
A further level of intelligence is the one that overcomes the autonomy of the single infrastructural system reaching the coordinated management of many systems (energy, water, data, phone, ...) in an open, if possible, environment.
Starting from this meaning of "intelligence", being purely technical and perhaps even consumerist, the city becomes an object on which it is possible to apply economic models suitable to any commercial product. One of the most interesting model, applied to evaluate the evolution of the technology market, is the hype cycle model (Fenn, Raskino 2008). It hypothesizes that the emergence of any new product follows recurrent phases. The first phase creates strong expectations; the second is a phase of disenchantment, and only later there is the "enlightenment", phase in which that technology shows its effective potential.

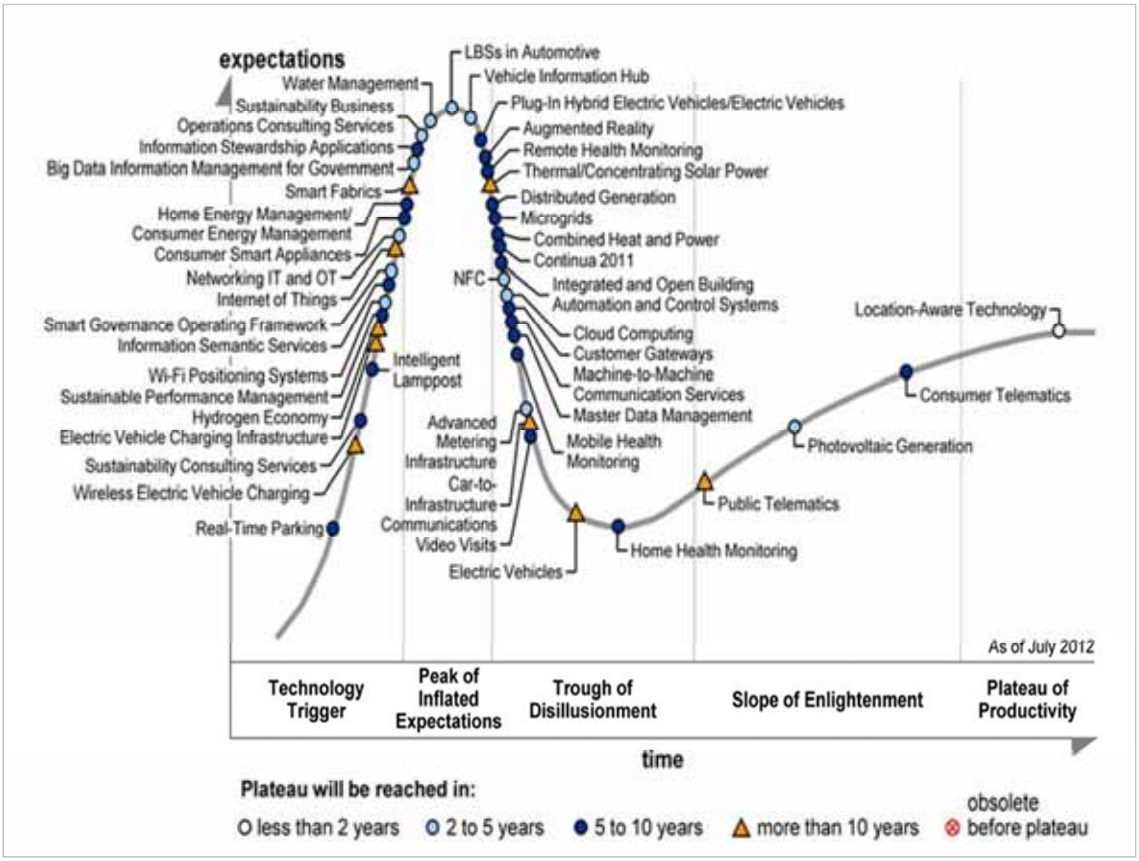

Fig. 3 – Hype cycle model

This trend can be applied in the case of "high intelligence" urban systems, normally defined in the literature as "smart city" (Papa, Gargiulo, Galderisi 2013; Fistola 2013).
At first, the neologism "smart city" was used to label ambitious plans for fully sustainable and computerized new towns, projects with a so high costs to curb the achievement. The disillusionment towards these adventures has prepared the ground to the third phase of the smart cities. It is based on an approach according which the cities develop sectorial projects creating a different way to access the services, which are addressed to an overall sustainability of the urban system and show a strong synergy among different subjects.

Therefore the cities are to revise their action, as, indeed, they have always done in the past. «All this suggests that the smart cities of the future will not be those created from the top down, but those that have grown organically more intelligent. Cities will not look very different from how they do today, but they will operate more efficiently thanks to the "data exhaust" they generate» (Siegele 2012).
From this assertion results the following consequence: as in the past, also in the future every city will evolve with its own characteristics, keeping and reproducing its specificities: in fact «every place is different. Every city, town or busy street is different from every other; often in many, important and significant ways. You can't just cut successful design or policy solutions from one place, paste them to another, and simply expect them to work like a dream. So you shouldn't. What you should do, instead, is to examine the conditions that made for success in the one place and try to work out if and how they can be replicated in your place» (Dales 2013).
Such considerations can be applied also, and above all, to the evolution of the energy systems that innervate the cities.

4 ENERGY DEMAND AND SUPPLY

Networks and infrastructure nodes represent the vital elements for the urban and territorial structures, because they make it possible to deliver the "oxygen" needed by the city, made up of energy, goods, and information. But also goods and information cannot circulate without energy.
For a long time the organization of the energy distribution has been essentially based on the purchase, on the international market, of the raw materials needed to meet domestic consumption, organizing consequently its production and distribution. In this phase «no one has ever asked if citizens did a reasonable and efficient use of energy, or not. It was made a 'supply programming policy', as called by technicians, without caring about teaching the consumers how to use only as much energy as it really needed» (Silvestrini 1980, 11).
Also thanks to this irresponsibility, energy consumptions have increased with remarkable rate over the years, with a growth that seemed unstoppable for a long time, up to the moment where the increase in the energy costs has become unsustainable.
From an economic point of view, the energy costs have a visible component – that is the cost of production, distribution and taxation – and an unseen component that strongly influences the first.
The visible costs of energy have grown significantly in the last thirty years. On January 1, 1980 a liter of diesel fuel was purchased at 0.12 Euros (250 Italian Liras), in the summer of 2013 the same liter of diesel costs 1.75 Euros. By comparison, a liter of bottled mineral water in 1980 was paid 0.20 Euros (more than diesel fuel), now 0.50 (one third of diesel fuel).
The strong increase in the price of oil has been the most significant factor relating to the increase in the price of fuel. The price of oil is a paradigmatic case of supply and demand. The supply has not increased in proportion to the growth in demand, driven worldwide because countries like China and India, as well as other developing countries, are strongly increasing their demand for petroleum.
This demand couples with the weakness of the dollar, which makes it worthwhile to invest (or to speculate) in commodities such as oil. These causes are pushing oil prices up.
Also the invisible component has affected this trend. This component is formed by at least three elements raining down on the final cost of energy products. The first is the critical condition of the environment in which we unload the wastes resulting from the combustion; the second is the undefined quantity of the row material reserves, in particular oil and coil (Maugeri 2013); the third is the geopolitical component, since the major energy reserves are often used as pressure instruments in the international policy.

The answer to this situation has been the variation of the national energy policies. This change of route has added to the supplies actions other actions concerning the demand, pointing out the negative consequences of an indiscriminate use of energy and the potentialities related to the processes of production and consumption from sustainable sources.

It is necessary, however, to act in this direction in a more effective way. If the progresses in the field of the sustainable and zero consumption building are evident, for example, the progresses in the field of the planning of urban areas and of mobility networks are less evident. As regards that, it could be useful to introduce specific evaluation systems for urban areas, targeted to achieve their sustainability certification, in the same way as for the buildings (Mazzeo 2013).

The need to work on this topic comes from the observation that, even in the most advanced cases of attention to urban sustainability, the action is still sectorial. If we analyze the case of Amsterdam, we can observe that the city is engaged in a set of sector programs characterized by high sustainability with the aim of reducing its environmental impact by increasing, at the same time, its national and international attractiveness (Berthon, Guittat 2011).

The overall programme has three primary objectives in the environmental field, as stated by the European Community regulations (EU 2007): reducing CO_2 emissions by 40% by 2025 compared to 1990; deriving 20% of the used energy from renewable sources by 2025; and achieving neutrality in terms of CO_2 emissions by 2015.

The achievement of these goals requires the interaction of different types of technologies and design methodologies (smart meters, electric vehicles, smart building design, ...) that can promote energy efficiency in different sectors. A special attention has been given to the electrical distribution, with a control center that manages the entire power grid, using information and communication technologies, and that provides more reliable, safe and economic electricity, with a smaller amount of emissions of carbon dioxide.

Nevertheless, even in the case of Amsterdam, the action towards a smarter city is carried out by sectorial technological projects and still does not develop actions in order to achieve a coordinate management of the activities, characteristic of the strategic and urban planning.

5 ENERGY AND INFRASTRUCTURES: A SCENERY FOR THE CITY OF TOMORROW

In September 2013 at the MAXXI of Rome the exhibition “Energy – Oil and post-oil architecture and grids” ended.

The exhibition was centered on the development of the Italian energy system after the World War II and its fundamental role in the industrial development. Through a photographic journey, it also analyzed the current landscape of the energy infrastructures in Italy. To complete the exhibition there were several suggestions and views for the near future city and territory, based on the passage from the oil to other, more sustainable, energy types and on their subsequent impact.

The examples that witnessed the history of the energy in Italy showed their ability to influence the urban landscape and the Italian landscape (Ciorra 2013): as striking example there were the highways and the support infrastructures as the “Autogrill”.

Fig. 4 – Oil and post-oil architecture and grids, MAXXI, Rome, March 22nd, September 29th Visions Section

What happened in the recent past allows us to assume that also the transition to other types of energy could have the same huge impact and promote the same alteration of image and meaning.

The question is not of minor importance: if we state that the energies of the future will be sustainable, it can easily supposed that the production modes and the distribution networks will have to change radically.

This line of thinking can be true both for the nodes of production and for the modes of supply of the energy needed for the urban functions and for the personal and collective vehicular travels.

The production of refined fuels is possible only in specialized factories, the refineries, large plants located in areas that can be easily reached from the oil fields. The distribution of refined products departs from these factories. This means that there are few areas where large plants with a continuous loop are gathered, from which the product is carried to smaller and diffused distribution nodes until reaching the final user.

The same occurs for the production of electric energy: a limited number of plants in which the productive cycle takes place, which from oil, natural gas, coal, water, or other source leads to the production of electrical energy, and from which the distribution grid that reaches home, factories, and offices starts.

The situation changes radically if we consider the energy produced by sun or by wind. Each point of a territory becomes a side suitable for production, distribution and consumption of energy. This does not affect the importance of the grids, especially in order to convey energy to the sites with high demand and to pass data and information (smart grid), but they will be accompanied by an increasingly high percentage of locally product energies (“zero distance” energy).

The above-said assumptions points out the need for optimizing the use of energy at all scales, from the building to the city. The production from renewable sources allows to reason not only in terms of “network”, but also in terms of “island”. This concept can be applied to the case of distributed and widespread production over an area. «Consumptions as much as possible on local level, storage capacity, energy islands that intersect with those nearby creating smart areas on regional level» (Cianciullo 2013).

Fig. 5 – Trento, Albere neighborhood. Project by Renzo Piano

In this perspective any road, building, neighborhood, public property become a potential location for the energy production, and the visible elements of these production's processes (wind turbines, solar panels, ...) will became integral elements of the urban and territorial landscape. In other words «the increasing use of new technologies in all the fields of collective life changes the behaviors, the social relationships and, then, the organizational forms of life. The change of the relationships among the social subjects tend to evolve into more and more complex forms that necessarily require a formal, functional and semantic re-design of the anthropic space at different scales, from the urban scale to the building/architectural scale» (Papa 1993).

If one of the challenges of the near future will be the management of an energy system characterized by a strong territorial continuity, both in production and in distribution, two are the lines of this management process. The first is the control of the introduction of new energy production systems in a largely man-made territory, where evident marks of stratified architectural presences are contained. The second, related to the previous one, is the regulation of the use of technologies for the production and the distribution.

The main feature of the regulations will be the flexibility. It is necessary because technologies change fast, sometimes faster than the context they operate in, so it will be necessary to avoid laws and regulations that can limit the realization of the projects, reducing the possibilities of development and their potential positive impacts.

6 ECONOMIC FACTORS AND URBAN EVOLUTION

The implementation of the above-shown scenario can greatly affect the image and the working of the city as it is today, and in the same way as any other economic and energetic revolution has done previously.

From the description of the scenario an important statement derives, namely that the true engine that causes the changes in the city is the pursuit of the utility in economic terms.

Many examples seem to go in the direction of this statement.

At the end of seventies London was a city affected by a heavy crisis (Thornley 1992). The inversion and the rebirth of the city occurred when the way of considering the role of the State changed, namely at the time when the neoliberal policies imposed an overhaul of Great Britain on basis far from those of the Labour

welfare. Just these policies have created the conditions for the rebirth of the city by encouraging the transfer of massive capital funds towards the city, which turned into investments, in creation of jobs and in redevelopment of whole urban sectors. The same strenght of the London Stock Exchange has encouraged the city giving it the role of primary node of the international financial exchanges.

Obviously, these processes have emphasized the income differences among social groups and the strengthening of the richer urban users, but this does not affect the leading role re-conquered by the city on global level.

Like other Chinese cities of the Eastern coast, in recent years Shanghai has been transformed in one of the driving areas of the China's economic development. This development, based on a pressing liberalization and on a stiff political control, had a significant impact on the form and on the metropolitan dimension of the city. It is in the Chinese cities – until the eighties made asleep by the ideological action of the Communist Party – that the same power has laid the basis for the radical economic change that has affected the country.

Also in this case there are negative implications. Among the others, the accelerated urbanization process that is blowing out all the Chinese megacities, and the high level of pollution in the urban areas (Mazzeo 2010).

From these examples it comes out that the assessment of the urban transformations are forced to deal with the economic factors that make them achievable.

The action of economic activities has been considered from Von Thünen onwards as the primary factor for the localization and development of urban centres (Grotewold 1959). Extending the reasoning it can be argued that the economic factors are the main cause of the urban phenomenon evolution, and their strength is so great that it prevails over most of the measures designed to regulate, including those implemented by planning.

Modern cities are shaped by economic factors that transform them, often to the point of distorting their structure and their shape. Structure and shape have remained unchanged only where the economic forces had been weak; and often these cities are dead cities or destined to this end.

In this context, the most recent scenarios consider the green economy and the smart economy as rapidly developing sectors (UNEP 2011; EEA 2013), for which it is conceivable that in the future these sectors could play an increasingly important role among the whole economic factors, becoming the driving forces able to shape and adapt the form and functions of the city.

As mentioned, these considerations overshadow the role of planning and require a review of its aims and its instruments.

Planning has often considered its work as predominant, and sometimes also in competition with the wealth-producer processes. Many planning theorists have thought the matter as an autonomous activity capable of creating an 'orderly and happy' urban structure.

The utopians such as Owen tried to draw urban structures in which production, dwelling, and services were present at the same time. Given the scarce results obtained and the condition of the cities after the industrial revolution, utopians have been replaced, on the one hand, by the planners associated with the established power, on the other hand, by the "militant" planners, who considered planning as one of the many variations of the political activity.

The current situation is clearly defined in the analyses of some sociologists. In the book *The Postmodern Condition* (1979), Jean-François Lyotard has analyzed the issue related to myths. Lyotard thought that the revolution of the eighteenth century have caused a complete dislocation of the mythical values, on which the existence of the society had been based up to that moment. «The modernity of the eighteenth century has

got rid of the myths of the origins (...) and has replaced them with the myths of the future (...), universalistic myths, which evoke the future of the humanity beings» (Augé 2005). Planning was an integral part of disciplines permeated with the myth of a better future also for the cities.

The transition from the modern to post-modern age is the time when these universalistic myths are thrown into crisis, causing the bitter fall of the illusions founded on the progress of humankind. And now that utopia has fallen, planning is naked in front of a reality most affected by economic factors.

To the emptiness left by the myth of the egalitarian society it has been tried to answer in different ways. Sustainability, participation, technological innovation, urban regeneration, ... are all strands where planning has tried to develop its action in absence of a recognized and original line of thinking.

To quote Baumann (2013), it is as if planning had entered in a fluid period of interregnum, in which the old rules (of any kind) don't work anymore and in which the new rules have not been invented yet, because there are ongoing changes without no reference points. This is equivalent to a state of crisis that «consists in the fact that the old dies and the new cannot be born», as Gramsci wrote (1975, Q. 3, § 34). Moreover, «in this interregnum most various pathological phenomena occur»: a state of crisis full of dangers but also full of new challenges for the city, for its managers and for its planners.

7 ELEMENTS FOR DISCUSSION

The need to reconsider the ways to produce and consume energy in the cities represents a challenge to the management of the urban systems.

Cities should aim at overturn their attitude to the energy problem: from simple consumer of resources and energy, they should become producer and consumer at the same time, finding internal production factors that would affect environment in lower percentage.

Here we want to sum up some discussion points contained in the paper, delving into the relationship between cities and energy infrastructures.

The starting point is the city meant as intelligent system. We have tried to show that, starting from the contributions coming from different research areas, there is a convergence of analysis that identifies an organizational intelligence in the urban structure. This intelligence adapts the urban evolution to the external environment, giving the city its own intrinsic degree of resilience.

This characteristic enables the city to adapt also to changes forced by critical processes of environmental involution, as long as all its components (physical, functional and anthropic components) are able to react in an effective and coordinated way.

In the last years the association of the word "smart" to the term "city" has extended. This association is a purely utilitarian expedient: smart city is not a more intelligent city, but a city more equipped with instruments intended to drive, or to address, specific moments of the daily life of citizens. It can be said that a smart city is a city where people have the possibility of being more stupid, since they have given part of their intelligence to external control and management systems.

In this context, the energy problem clearly shows the difference of approach between intelligent city and smart city. An intelligent city is a city that learns to produce and to consume on the basis of its needs, and that from this learning ability draws new elements for further reducing its waste of global resources. A merely "smart" city, indeed, is a city that adopt forefront technological tools allowing them to control the behaviors without learning from this process and improving its critical ability.

The present organization of the society plays an important role, in which economical and productive processes – targeted only to reach efficiency and profit – are fundamental. In this context, the green economy does not seem to be different from the previous economies.

Energy infrastructure, nodes and grids will become increasingly smart. We have replaced the incandescent lamps with low consumption and long life lamps, and then we have used the LED lamps and so on. We will replace the internal combustion engine car with an electrical car. paper will be replaced by files.
We will tend to consume less energy per unit of performed work. We will always be more "sustainable", but not because we are aware that it is necessary to be sustainable. On the contrary, we will do so only because research and industry will launch new products and applications able to perform higher efficient works, making the user believe that, even if the consumption level increases, the waste of the already scarce resources at his disposal decreases and, therefore, he is relieved of his responsibilities.
As Orazio wrote Orazio «Prudens futuri temporis exitum / Caliginosa nocte premit Deus» (Ode 3, 29). If "a prudent god hides the events of the future in a dark night", we cannot neglect the inscrutable that always exists when we reason about future scenarios, however satisfied with the progress done and however confident in the future.
Therefore we affirm that the city of the future will be as intelligent, sustainable and democratic as the present one and may be more than this, and the access to the energy will be one of the litmus tests of these evolutionary characters. On condition that you remember that the city, like society, is also deeply unfair. It is the place where the extremes co-exist, and these extremes, most likely, will tend to increase the distance between them in the future.
Machines and applications that run on more and more powerful networks will make this city over-connected and over-controlled. Poles, panels and green architectures will make it different from today. But, like today, it will be a place where the incongruous and the unpredictable will work alongside the rational and the planned, showing that the city is intelligent, then manageable but not so much.

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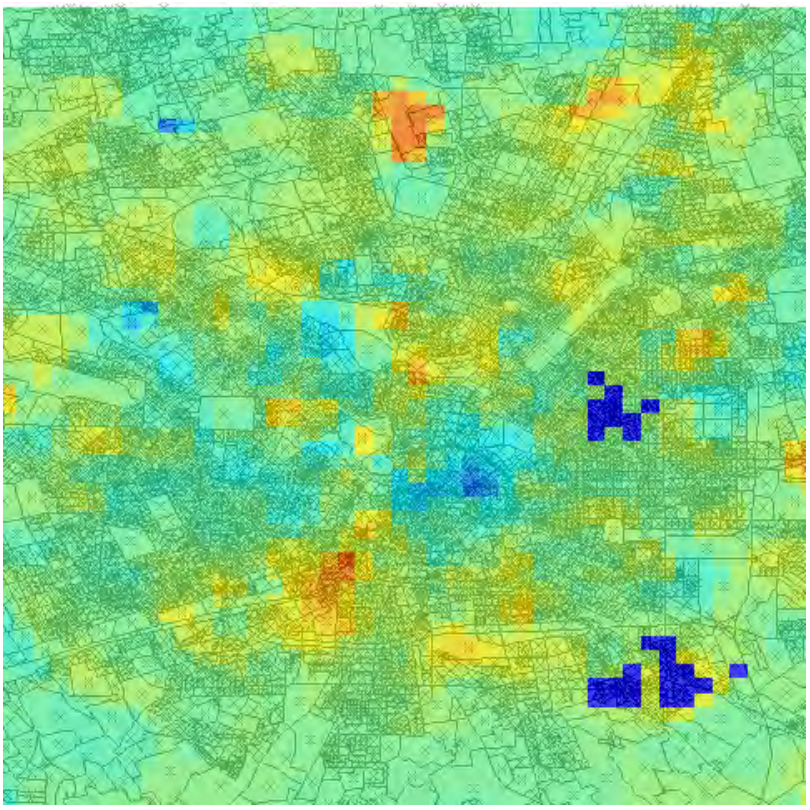

DATI DI TRAFFICO TELEFONICO E POLITICHE PER LA MOBILITÀ

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ABSTRACT

The paper focusses on the potentialities offered by mobile phone data to provide useful knowledge of site practices and rhythms of usage of contemporary city, for more effective and equitable mobility policies.

Starting from the results of a research carried out at the Politecnico di Milano, using mobile phone data provided by Telecom Italia and finalized to verify the meaning of mobile phone data in returning the density of land use (Manfredini, Pucci & Tagliolato, 2012 and 2013) and the origins and destinations of daily movements (Tagliolato, Manfredini & Pucci, 2013), we will highlight how new maps, based on the processing of mobile phone data can represent spatialized urban practices and how they can give new insights for analyze space-time patterns of mobility practices.

In our research, mobile phone data, returning new maps of site practices in Lombardy Region with information on temporary populations and city usages patterns (daily/nightly practices, non-systematic mobility), allowed to trace "fuzzy boundaries" as perimeters of practices, proposed like a tool for supporting and increasing the efficiency of urban policies and mobility services.

In the paper, the identification of temporary urban populations through two types of mobile phone data (density of the calls and origin - destination traces of the calls) has not only a knowing purpose, but it is the condition for recognize new claims referred to "communities of practice", by which to build mobility policies incisive, also because not generalist.

KEYWORDS:
Telephone traffic data, mobility, mobile communities

1 SE LE FONTI SONO OPACHE RISPETTO A NUOVE FORME DI MOBILITÀ

Le analisi delle pratiche di mobilità si misurano da tempo con i limiti delle fonti disponibili che restituiscono perlopiù spostamenti in forma aggregata e in termini di flussi, non iscritti in uno spazio topologico, indifferenti quindi alle caratteristiche dei luoghi e alle modalità con cui le persone, con diverse finalità, utilizzano gli spazi urbani e le infrastrutture.

Le fonti disponibili, spesso non aggiornate, se non datate, offrono rappresentazioni sfuocate, incapaci cioè di restituire i ritmi[1] d'uso del territorio, legati alle modificazioni dell'organizzazione del lavoro e delle norme sociali[2].

Trasformazioni nelle dinamiche di mobilità spaziale emergevano già nel decennio scorso, analizzando i dati statistici "tradizionali" come gli spostamenti pendolari per motivi di lavoro e di studio (censimento Istat 2001) e le indagini sulla mobilità non sistematica disponibili per alcuni ambiti territoriali o in riferimento ad alcuni specifici temi (*survey* e indagini O/D).

Così, ad esempio, in Lombardia, i dati disponibili restituivano un uso articolato e complesso del territorio, esito di una trasformazione nella natura stessa degli spostamenti: i movimenti obbligati, per motivi di lavoro e di studio, caratterizzati da orari fissi e tragitti altrettanto definiti tra una origine (abitazione) e una destinazione (posto di lavoro/scuola), si ritagliavano un peso sempre meno significativo, a fronte dell'affermarsi di spostamenti per motivi personali, legati allo svago, agli acquisti, molto più articolati nel tempo e nello spazio.

Queste forme di mobilità multidirezionali che definivano cioé relazioni meno gerarchizzate e più articolate, soprattutto nei territori più dinamici della regione lombarda (Pucci, 2006; Pucci, 2007), spesso non trovavano nelle reti della mobilità e del trasporto pubblico una adeguata risposta in termini di offerta di collegamenti e di servizi, ancora prevalentemente radiocentrici e convergenti sui principali centri urbani.

Anche dalle poche fonti sulla mobilità non sistematica disponibili (O/D Regione Lombardia, 2002), si poteva leggere una complessificazione della catena di spostamenti giornalieri che concorreva a dilatare le fasce di punta giornaliere e che si accompagnava a un incremento dei tempi medi di spostamento, in parte anche dovuto a fenomeni di congestione crescente da traffico veicolare.

La mobilità quotidiana, descritta dalle fonti ufficiali, si caratterizzava per spostamenti ricorsivi e multidirezionali che restituivano un uso allargato e denso dei territori e non solo nella regione urbana milanese, risultato delle trasformazioni intervenute nei tempi, nei luoghi e nei modi della vita sociale e dei programmi di attività che concorrono a strutturare il territorio.

Quanto e come queste dinamiche si siano intensificate nel decennio intercensuario, ci informano le esperienze quotidiane e le poche indagini mirate condotte dopo il 2001, poiché non sono disponibili dati aggiornati sulla mobilità comunale e i pur utili dati del censimento Istat 2011 (ancora non pubblicati), per le modalità stesse con cui sono stati raccolti[3], saranno in ogni caso "opachi" rispetto a nuove forme di mobilità quotidiana che si sono affermate nell'ultimo decennio.

1 Con riferimento ai lavori di Lefebvre, Amin and Thrift definiscono i ritmi urbani come "the coordinates through which inhabitants and visitors frame and order the urban experience" (Amin, Thrift, 2002, p. 17).

2 Sul piano individuale si è assistito a una razionalizzazione del tempo disponibile: lo si economizza per ridistribuirlo secondo una propria scala di valori nel corso della giornata, della settimana o dell'anno; il tempo diventa così più denso e, al contempo, "esploso", poiché differenziato. Sul piano relazionale, attraverso un regime di disponibilità permanente che tende a cancellare le frontiere tra privato e pubblico, si è assistito, per un numero crescente di figure professionali, a un indebolimento delle frontiere spaziali e temporali tra lavoro e vita privata, in relazione a un doppio processo che attiene da un lato a una "densificazione del lavoro", del suo contenuto, divenuto sempre più immateriale, dall'altro lato a una diversificazione dei tempi di lavoro e alla nascita di nuove tipologie di lavoratori (Godard,1997).

3 Il censimento Istat 2011 ha previsto un rilievo solo della mobilità giornaliera per motivi di lavoro e di studio, con informazioni unicamente sul mezzo impiegato e sui tempi medi di spostamento che, peraltro, non contemplano la possibilità di riconoscere spostamenti superiori a 90 min .

Se infatti nelle aree metropolitane si relativizza l'importanza dei movimenti pendolari nelle pratiche giornaliere di mobilità, accanto alla mobilità pendolare e alla mobilità "a sistematica" (legata cioè a motivi di svago e al tempo libero, al fare acquisto, al visitare amici ...), emergono nuove forme di mobilità che alcuni autori (Vincent Geslin, Kaufmann, 2011) hanno definito "reversibile", poiché relativa a "pratiche di spostamento che restituiscono un uso reversibile dei territori e delle reti" (Vincent Geslin, Kaufmann, 2011, p. 40). Si tratta cioè sempre di spostamenti legati al lavoro che assumono forme e temporalità più articolate rispetto agli spostamenti pendolari del secolo scorso[4].

Lo sviluppo crescente di forme di mobilità reversibile si spiega infatti perlopiù con le nuove possibilità offerte dalle reti di trasporto e comunicazione (mobilità come scelta), ma allo stesso tempo restituisce anche il compromesso tra l'attaccamento al luogo di vita[5] e la necessità di confrontarsi con un mercato del lavoro sempre più flessibile e aleatorio che obbliga, per avere un lavoro, a spostamenti giornalieri più lunghi (mobilità subita).

Se quindi in molti casi la mobilità reversibile costituisce una alternativa alla rilocalizzazione residenziale, in altrettanti casi la stessa è determinata da vincoli perlopiù dettati dal mercato del lavoro: la necessità, ad esempio, di spostarsi sempre più lontano per raggiungere giornalmente il luogo di lavoro, in assenza della possibilità di un trasferimento di domicilio che vincoli familiari o economici impediscono.

Queste forme di mobilità ibrida rappresentano una realtà importante, come emerge da alcune ricerche condotte, tra cui UE JobMob (Job mobilities and Family Lives in Europe http://www.jobmob-and-famlives.eu/) che individua tra le forme di mobilità quotidiana obbligata a cui prestare attenzione nelle politiche urbane europee: i pendolari di lunga distanza che destinano più di due ore del loro tempo al viaggio verso il luogo di lavoro; gli *overnighters* cioè persone che passano più di 60 notti/anno fuori dal loro domicilio abituale per motivi di lavoro, i "trasferiti recentemente", coloro che hanno effettuato una migrazione residenziale di più di 50 km per motivi professionali, le "relazioni di coppia a lunga distanza" tra coppie stabili che vivono in abitazioni diverse lontane più di un'ora di tragitto per motivi professionali e, infine, i *multimobiles*[6].

La complessità delle forme che assume la mobilità quotidiana era peraltro già in fieri in alcune ricerche degli anni'90 che articolavano le forme degli spostamenti legati al lavoro in modo più complesso rispetto a quanto restituito dai dati del pendolarismo casa-lavoro. Bericat (1994) distingueva tra *mobility to work* (i tragitti casa-lavoro), *mobility in/at work* (gli spostamenti svolti durante l'orario di lavoro, ad esempio per una riunione) e *mobility because of work* che traduce fenomeni di bi-residenzialità.

A una mobilità quotidiana che restituisce spostamenti ricorsivi secondo ritmi giornalieri variabili, non più riconducibili ai tradizionali orari del lavoro dipendente, si affiancano anche forme di mobilità periodica, occasionale e/o non ricorsiva, legate a fenomeni quali la multiresidenzialità, ma anche una mobilità pendolare periodica (1/2 giorni a settimana) di lunga distanza, associata al lavoro a domicilio che concorrono a intensificare la densità e il numero degli spostamenti quotidiani.

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[4] La mobilità reversibile è l'esito dell'effetto congiunto di due processi:
L'evoluzione del mercato del lavoro che impone una sempre maggiore flessibilità ed è soggetto a una maggiore imprevedibilità;
Le proprietà del territorio e delle reti di trasporto e di comunicazione che consentono di annullare le distanze fisiche, reinventandole.

[5] Per Vincent Geslin e Ortar (2012) è legato a tre condizioni: caratteristiche materiali e sensibili del luogo di vita; caratteristiche sociali (reti di relazioni) e caratteristiche culturali.

[6] Questa categoria, introdotta da Montulet et al. (2008), restituisce la "multi-appartenenza" a diverse comunità mobili, poiché la categoria dei "*multimobiles*", è composta da persone che appartengono simultaneamente a diverse "categorie mobili".

Queste nuove forme di mobilità, sia quotidiana che periodica, giocano sulla combinazione tra velocità offerta dalle reti per la mobilità e dai sistemi di comunicazione e capacità degli attori di appropriarsi dei sistemi tecnici.

Le conseguenze di queste pratiche di mobilità, espressione di popolazioni diverse che usano i mezzi e le risorse disponibili per lo spostamento in relazione non solo alla loro disponibilità effettiva, ma anche ai propri progetti personali, alle proprie preferenze e alle proprie capacità (competenze, accesso ai diversi mezzi, disponibilità finanziarie….), si leggono nel territorio che assume la forma di "un arcipelago" di luoghi e di legami che rivelano più una volontà di radicamento che di nomadismo. Il radicamento al luogo di residenza prevale e diventa la chiave per interpretare anche le mobilità reversibili.

In queste nuove pratiche di mobilità è il tempo e non la distanza a giocare un ruolo significativo: il tempo per gli spostamenti obbligati (lavoro, scuola), attorno a cui si organizza e da cui dipende il tempo personale, si fa più frammentario e con esso la variabilità spazio-temporale delle pratiche d'uso della città contemporanea.

Queste trasformazioni nelle pratiche di mobilità interrogano le fonti disponibili ed aprono a sfide operative che si misurano sulla capacità di integrare fonti esistenti - con cui si studiano gli spostamenti in modo aggregato (flussi O/D) riconoscendo una proporzionalità diretta tra utilità e costo / tempo dello spostamento - con approcci perlopiù interdisciplinari che interpretano la mobilità come forma spazializzata di interazione sociale[7], sperimentando anche nuove fonti.

In questa prospettiva, un interessante contributo viene dalle fonti digitali e, più in particolare, dalla telefonia mobile quale strumento per un monitoraggio in tempo reale delle dinamiche urbane e delle pratiche di mobilità.

2 NUOVE POSSIBILITÀ OFFERTE DAI DATI DI TRAFFICO TELEFONICO

Negli ultimi anni, numerosi progetti di ricerca hanno indagato se e come i dati di traffico telefonico possano essere utilizzati come strumenti di analisi e di rappresentazione delle dinamiche urbane e degli spostamenti individuali (Ahas, Mark, 2005; Ratti, Pulselli, Williams, Frenchman, 2006; Kwan, Dijst, Schwanen, 2007; Reades, Calabrese, Sevtsuk, Ratti, 2007).

In questi studi – incentrati sull'analisi, visualizzazione e interpretazione dei dati di traffico telefonico per restituire la densità d'uso e gli spostamenti delle persone, soprattutto in ambito urbano - gli utenti che generano traffico telefonico possono essere considerati come una rete di "sensori", distribuiti nel territorio e in grado di fornire informazioni sulle forme e sui modi d'uso dello spazio urbano, difficilmente ottenibili da altre fonti di dati, tradizionalmente utilizzate negli studi urbani.

In effetti, i dati di traffico telefonico offrono informazioni aggregate, omogenee nel tempo e nello spazio, sulla intensità del traffico rilevato dalle antenne del network, distribuite nel territorio, a costi e con tempi di trattamento dei dati inferiori a qualsiasi fonte tradizionale.

Le sperimentazioni avviate in letteratura[8] sui dati di traffico telefonico hanno lavorato principalmente su due diverse tipologie di dati: le densità di chiamate espresse in Erlang e i flussi rilevabili a partire da tracce localizzate e anonime di utenti di telefoni cellulari.

Si tratta di informazioni che non possono avere il dettaglio ottenibile con l'impiego di *Tracking technologies*, basate principalmente *sull'active mobile positioning* (*tracing*) che avviene mediante una specifica richiesta di

[7] Si tratta di approcci che considerano cioè la mobilità come capitale sociale e il territorio come spazio delle interazioni sociali, favoriti dalla mobilità.

[8] Per una sintetica ricostruzione si veda Pucci, Manfredini, Tagliolato (2013) in http://www.dastu.polimi.it/uploads/media/003-2013_DASTUwp_PucciManfrediniTagliolato.pdf

localizzazione di tracce di spostamenti individuali di un campione di persone scelto a priori, di cui si può avere anche il profilo socio-professionale[9].

Nonostante si tratti di dati anonimi e aggregati, i dati di traffico telefonico offrono in ogni caso opportunità significative sia in termini di disponibilità del dato, sia in termini di risoluzione spaziale e temporale dello stesso, consentendo cioè di indagare dinamiche territoriali senza ricorrere alla selezione "a priori" di un campione di individui da monitorare, come nel caso delle *Tracking technologies*, che necessariamente condiziona e orienta gli esiti delle indagini, oltre a essere quantitativamente più circoscritto.

Questo è il motivo per cui molti autori (Ahas, Mark, 2005; Reades et al. 2007; Ratti et al. 2006) indicano il monitoraggio anonimo e passivo del traffico telefonico come un valido complemento ai metodi tradizionali impiegati nell'analisi delle dinamiche urbane, in quanto può risolvere i limiti legati ai tempi di rilevamento tradizionali (è possibile derivare facilmente informazioni in tempo reale sullo stato della rete telefonica) e, al contempo, offre una alta pervasività di rilevamento nel territorio, dovuta all'enorme diffusione dei telefoni cellulari.

Le ricerche condotte hanno sperimentato la validità dei dati di telefonia mobile nel restituire le densità d'uso del territorio e la mobilità, secondo tre diversi approcci: studiando le relazioni tra coordinate spaziali del traffico cellulare e profilo socio-professionale delle persone che generano il traffico stesso (*Social Positioning Method* proposto da Rein Ahas and Ülar Mark, 2005); ricercando una correlazione tra intensità di attività telefonica, restituita per celle e distribuzione della popolazione nelle città (Sevtsuk, Ratti, 2010); utilizzando i dati di traffico dei telefoni cellulari come strumento-sonda per il monitoraggio del traffico (Caceres et al. 2008; Qiu et al. 2007; Fontaine, Smith 2005).

In tali approcci i dati aggregati di traffico telefonico sono trattati come il risultato di comportamenti e abitudini individuali, capaci quindi di restituire le tracce di popolazioni temporanee. In quest'ottica, gli stessi dati diventano una fonte utile nel restituire la variabilità delle densità d'uso della città che le fonti tradizionali difficilmente riescono a intercettare con una risoluzione spazio-temporale paragonabile.

Sulla utilità dei dati di telefonia mobile per le indagini urbane e sulla mobilità sono state avviate diverse sperimentazioni (Ahas, Mark, 2005; Ahas, Aasa, Silm, Tiru, 2009; Becker et al. 2011), anche in riferimento alla possibilità di classificazione funzionale del territorio, derivante da trattamento dei dati di telefonia mobile (Reades et al. 2007, Soto et al. 2011).

Questo aspetto riveste una particolare importanza per le politiche urbane perché consente di leggere la variabilità nei modi e nei tempi d'uso della città e, al contempo, di identificare diverse popolazioni temporanee che generano domande diversificate e che definiscono, attraverso le loro pratiche, geografie spazio-temporali d'uso del territorio che interferiscono necessariamente con i perimetri delle politiche istituzionali.

3 DATI DI TRAFFICO TELEFONICO PER LEGGERE LE DINAMICHE URBANE: UNA SPERIMENTAZIONE EMPIRICA

Da alcuni anni presso il Dastu Politecnico di Milano e in collaborazione con Telecom Italia, si è avviata una esperienza di ricerca[10] sulla significatività dei dati di traffico telefonico nel restituire le densità d'uso del

[9] Le metodologie di raccolta dei dati da telefonia mobile sono riconducibili a due principali tipologie: il posizionamento attraverso l'utilizzo di dati di telefonia mobile di un campionamento di tracce individuali *(tracking tecnologies)*; l'utilizzo di dati aggregati rilevati da antenne (principalmente *cell towers*) che restituiscono la densità di chiamate telefoniche.

[10] "Utilizzazione di dati di traffico telefonico nell'ambito di applicazioni urbanistiche e territoriali", convenzione di ricerca tra Dastu, Politecnico di Milano e Telecom Italia (2010 e 2011), coordinamento Fabio Manfredini e Paola Pucci, con Paolo Tagliolato e con Paolo Dilda e Carmelo Di Rosa.

territorio (Manfredini, Pucci, Tagliolato, 2012 e 2013) e le origini e destinazioni dei movimenti giornalieri di mobilità (Tagliolato et al., 2013).

La ricerca, condotta sulla Regione Lombardia utilizzando dati di traffico telefonico forniti da Telecom Italia, ha dapprima indagato la significatività e utilità dei nuovi dati per gli studi urbani (Manfredini, Pucci, Tagliolato, 2012) e per la mobilità (Tagliolato, Manfredini, Pucci, 2013), quindi ha sperimentato come e se le rappresentazioni delle dinamiche dei dati di traffico telefonico possano restituire la geografia spazio-temporale delle pratiche urbane e dare indicazioni utili a comprendere i modi d'uso e gli stili di vita delle popolazioni (Pucci, 2013).

La ricerca ha potuto elaborare sperimentazioni su due diverse tipologie di dati di traffico telefonico che restituiscono informazioni differentemente utili per il riconoscimento di dinamiche d'uso del territorio.

La prima tipologia di dati concerne la densità di chiamate telefoniche (Erlang), rilevate dalle antenne della rete radiomobile di Telecom Italia, relativa al territorio della Regione Lombardia e disponibile dal mese di gennaio 2009. L'Erlang descrive la densità del traffico telefonico ogni 15 minuti per aree di dimensioni pari a 250 m x 250 m. Il dato è stato dapprima trattato statisticamente per essere confrontato con variabili ricavabili da fonti di dati consolidate al fine di valutare le possibili ed eventuali correlazioni tra variabilità nell'intensità delle chiamate da rete cellulare e condizioni urbanistico-insediative (Manfredini, Pucci, Tagliolato, 2012).

Questa preliminare valutazione sui dati di densità di chiamate (Erlang) ha messo in evidenza alcuni limiti evidenti[11], ma anche potenzialità rilevanti per gli studi urbani, poiché il trattamento di questi dati permette di costruire alcune elaborazioni di grande interesse sulla intensità e variabilità spazio-temporale delle pratiche d'uso della città, anche connesse alla organizzazione di grandi eventi temporanei (come il Salone internazionale del Mobile) che attraggono, in periodi temporalmente circoscritti, grandi quantità di turisti, di *city users*, di popolazioni temporanee che si distribuiscono nella città, secondo ritmi diversificati, utilizzando intensamente alcuni servizi urbani (fig. 1).

Tali dinamiche, difficilmente cogliibili dalle fonti tradizionali soprattutto se l'evento non è concentrato in un unico luogo (come appunto il Salone del Mobile che con "il fuori salone" organizza eventi in diversi punti della città di Milano), rappresentano una informazione utile sia per la gestione dell'evento, sia per valutare i suoi impatti sul sistema territoriale (mobilità, congestione) ed economico (indotto, turismo) e per orientare alcune scelte in tema di offerta di servizi dedicati (Manfredini, Pucci, Tagliolato, 2010).

L'interesse e la significatività del dato sono stati confermati anche da elaborazioni che, attraverso un trattamento statistico (*spatial clustering*), finalizzato a estrapolare unicamente i trends costanti e ricorsivi dei dati in Erlang nell'arco del periodo considerato (Manfredini et al., 2012), hanno reso possibile restituire l'intensità e la variabilità del traffico telefonico georeferenziato.

La distribuzione spaziale dell'intensità del traffico telefonico durante il giorno e le dotazioni del territorio - cioè la presenza di infrastrutture, servizi e attività di diversa natura - ci hanno permesso di individuare diverse popolazioni temporanee, caratterizzate da pratiche d'uso diversificate nel tempo e nello spazio, all'interno della Regione urbana milanese.

Attraverso il trattamento dei dati di densità di traffico telefonico è stato dunque possibile ottenere nuove mappe della Regione urbana milanese, capaci di restituire densità di chiamate variabili nel tempo.

[11] Il dato non consente di stabilire una correlazione "diretta" tra densità di chiamate (Erlang dati) e il numero di persone presenti in una cella, anche perché, come è noto, l'uso del telefono cellulare è condizionato dal profilo socio-professionale degli utenti (età, sesso, professione). Per questo lo stesso valore di Erlang registrato in una cella in 15 minuti di attività telefonica, può essere prodotto da 3 persone che parlano ciascuna per 5 minuti, ovvero da una sola persona che usa il telefono per 15 minuti.

Allo stesso tempo, le mappe prodotte consentono di collocare nello spazio “comunità di pratiche” (Wenger, 1998) che usano il territorio secondo temporalità e finalità diverse.

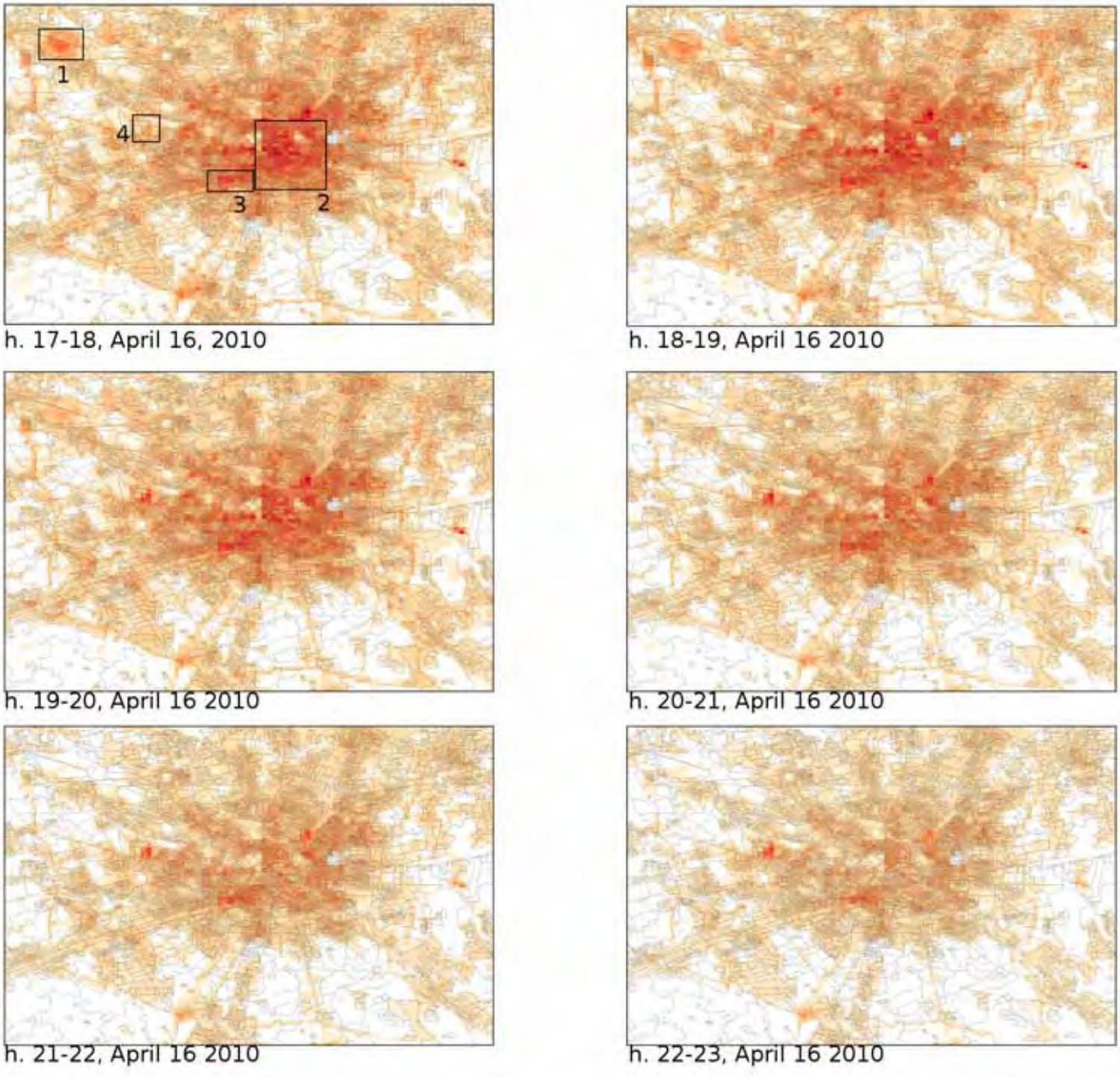

Fig. 1 Densità di traffico telefonico durante il “Salone Internazionale del mobile” e le attività del “Fuori salone” (16 Aprile 2010 dalle 17h alle 23 h). In evidenza gli ambiti urbani interessati dalle attività espositive (1) e del “Fuori salone” (2 e 3)

I risultati ottenuti presentano un certo interesse per le politiche di mobilità.

Le elaborazioni prodotte permettono, ad esempio, di osservare l'assenza di coincidenza tra i luoghi della mobilità pendolare del mattino e quelli del tardo pomeriggio (fig. 2). La carta dei territori della mobilità del tardo pomeriggio restituisce un arcipelago di luoghi densamente frequentati e legati allo shopping, alla cura della persona, ad attività personali che complessificano gli spostamenti serali, con conseguenze sulla rete infrastrutturale e dei trasporti pubblici.

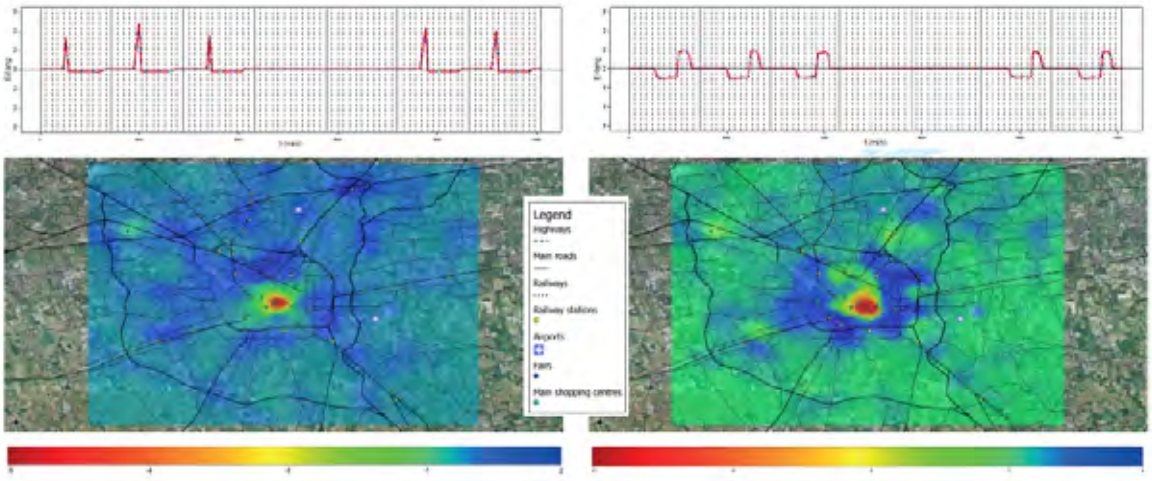

Fig. 2 I territori della mobilità quotidiana: il mattino (a sinistra) e la sera (a destra)

La catena di spostamenti dopo le 17.00 diventa dunque più articolata e complessa, poiché riferibile non solo e non tanto agli spostamenti legati al ritorno a casa dopo una giornata di lavoro, ma piuttosto alla frequentazione di luoghi diversi, da mettere in relazione ad attività personali.

In questo modo, coloro che sono pendolari tra le 8 h et 9 h del mattino si trasformano in *city users* tra le 17h e le 19h.

Le mappe rappresentano in modo efficace un modello di mobilità giornaliera tipico delle aree metropolitane, ma anche i luoghi in cui queste pratiche "hanno luogo" in modo ricorsivo. Ed è proprio questa caratteristica (la ricorsività) che ci permette di parlare di "comunità di pratica" o di "comunità mobili"[12]. Queste differenti popolazioni mobili generano dei perimetri contingenti, a partire dalle loro pratiche.

In questo caso, l'aggettivo contingente si riferisce alla capacità di trattenere, nella definizione di spazialità, la variabilità temporale connessa alle pratiche. Il riferimento a comunità mobili in quanto "comunità di pratiche" (Wenger, 1998), piuttosto che a "popolazioni metropolitane" (Martinotti, 1993), deriva dalla capacità della nozione proposta da Wenger di riconoscere la variabilità temporale e spaziale dei ruoli di ogni individuo, che può appartenere cioè a diverse comunità di pratiche nell'arco della giornata[13].

L'individuazione di queste comunità di pratiche attraverso la lente della mobilità non ha unicamente una finalità euristica, ma rappresenta la condizione attraverso cui riconoscere le nuove domande disaggregate per comunità di pratiche, su cui costruire politiche di offerta più efficaci e meno onerose finanziariamente, poiché non generaliste. Infatti l'uso del territorio che discende dal trattamento dei dati di traffico telefonico mette in discussione le politiche di offerta del trasporto pubblico, nonché la variabilità spazio-temporale di

12 "Groupes sociaux définis à partir de leurs inscriptions territoriales, de leurs pratiques de mobilité, des dispositifs techniques qu'ils mettent en œuvre" (Le Breton, 2006, p. 26).

13 Si veda anche Pasqui (2008) e, in particolare, la definizione di popolazioni urbane che l'autore propone a p. 148.

utilizzo degli spazi urbani, non necessariamente riconducibile alle funzioni offerte e ai loro tempi di attività, ma piuttosto ai modi con cui le persone frequentano alcuni di questi spazi. In questo modo, è possibile restituire i "ritmi urbani" generati dalle pratiche, piuttosto che determinati in base a orari di apertura/chiusura delle attività.

Le elaborazioni effettuate consentono così di mappare i territori degli acquisti, del tempo libero e dello svago (tra le 10 h e le 20 h) (fig. 3) che fanno emergere l'importanza, per queste attività, non solo del centro di Milano, ma anche del settore occidentale della città consolidata, piuttosto che dei grandi centri commerciali lungo l'anello delle tangenziali che sembrerebbero avere un peso molto meno rilevante nelle pratiche di acquisto del sabato.

Anche la geografia dei luoghi frequentati durante la notte restituisce mappe diverse nelle giornate di sabato sera rispetto alle sere feriali, così da consentire di mappare i territori del divertimento notturno che definiscono una geografia di luoghi densamente frequentati il sabato sera, del tutto differente da quella dei territori del lavoro notturno, cioè di quei luoghi frequentati dal lunedì al venerdì notte, per i quali va garantita un'offerta di trasporto pubblico anche di tipo non convenzionale (fig. 3).

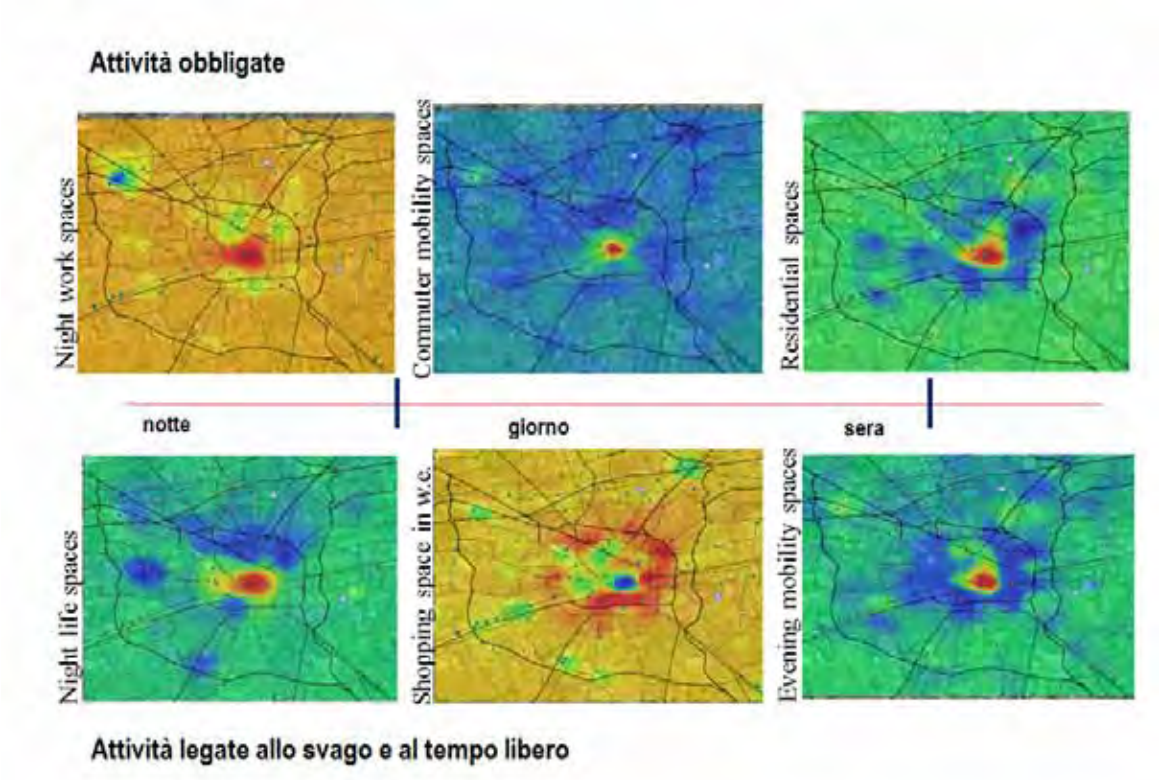

Fig. 3 I territori delle pratiche

Gli stessi dati contribuiscono a mettere in discussione alcune interpretazioni presenti in letteratura sui comportamenti erratici delle popolazioni metropolitane e sul nomadismo che caratterizzerebbe l'uso del territorio, come peraltro già alcuni studi condotti hanno evidenziato (Song et al., 2010).

Se infatti i dati confermano la importante densità di spostamenti giornalieri, gli stessi dati mostrano anche una forte ricorsività dei percorsi: ci spostiamo molto durante la giornata, ma seguendo percorsi conosciuti e

abituali. Questa osservazione rafforza il valore euristico dei territori contingenti, costruiti a partire dalle analisi della ricorsività delle pratiche di mobilità.

La seconda tipologia di dati su cui abbiamo lavorato consente di elaborare matrici origine-destinazione di flussi desunti dalle tracce localizzate e anonime degli utenti di telefoni cellulari della rete radiomobile Telecom. I dati sono stati raccolti in giorni feriali tra luglio e novembre 2012. In questo caso, le informazioni disponibili sono ricavate dalla geolocalizzazione di attività telefoniche di cellulari di utenti[14] e sono disponibile a livello di antenna che ha gestito l'attività. Per questo, presentano una grande capillarità spaziale e consentono di avere un dato ogni ora del giorno da una origine a una destinazione[15].

Le zone di origine e destinazione sono il risultato di tre diverse tassellazioni del territorio, sperimentate per arrivare a definire quella che meglio restituisse i flussi di spostamento[16]. Per questo studio, la tassellazione scelta è quella legata alla densità di antenne[17] che ha individuato in Lombardia 526 zone di origine e destinazione (Tagliolato, Manfredini, Pucci 2013).

I dati di origine-destinazione delle tracce di utenti di telefono cellulare hanno offerto la possibilità di mappare[18] la distribuzione degli spostamenti effettuati per motivi sia di lavoro sia personali, tra origini e destinazioni e per diverse fasce orarie giornaliere, di un campione realmente significativo di persone (più di un milione ogni giorno) (Tagliolato, Manfredini, Pucci, 2013).

Le elaborazioni prodotte hanno restituito, a grana fine e per ogni ora del giorno, i flussi prevalenti, confermando alcune dinamiche note, tra cui la polarizzazione degli spostamenti del mattino sui principali centri urbani e i poli di attività della regione, ma al contempo hanno permesso di far emergere anche la polverizzazione delle destinazioni degli spostamenti pomeridiani, in cui è rilevabile una articolazione più complessa della catena di spostamenti.

Si tratta di spostamenti spesso riconducibili a forme di mobilità non sistematica, in molti casi legata a spostamenti per motivi personali che vengono condotti dopo l'orario di lavoro.

La risoluzione temporale e spaziale dei dati consente infatti di far emergere quelle forme di mobilità che le fonti tradizionali non riescono a descrivere, così da restituire "the spatial and experiential dimensions of commuting rhythms, arguing that commuting can be alternatively conceived as a mobile practice" (Edensor, 2012, p. 189) che offre una ricca varietà di luoghi frequentati in base all'organizzazione oraria della giornata, legata non solo a eventi e attività obbligate (lavoro), ma anche ad attività personali (tempo libero, shopping, sport…).

Le elaborazioni prodotte portano infatti a ritenere che i dati disponibili costituiscano una fonte di rilevante importanza per leggere le dinamiche spaziali di mobilità giornaliera e il loro impatto sul territorio e sulle reti

[14] Con attività telefonica – via cellulare - intendiamo ogni interazione del dispositivo con la rete di telefonia mobile (ad esempio le chiamate ricevute o effettuate, gli SMS inviati o ricevuti, ecc.).

[15] Con la finalità iniziale di "validare" questa nuova fonte di dati, le prime elaborazioni hanno portato dapprima a ricavare la somma vettoriale dei flussi che si spostano da ogni zona in ogni ora disponibile del giorno di rilievo. Il vettore finale considerato nella matrice o/d e ricavato dalla somma di tutte le singole connessioni tra ciascuna zona origine e le altre destinazioni, è caratterizzato da due dimensioni: l'entità, che è funzione delle grandezze dei vettori d'origine e l'angolo che esprime la direzione del flusso. Per restituire una rappresentazione grafica, i vettori somma sono stati, infine, applicati a ogni zona della tassellazione del territorio regionale (Tagliolato et al., 2013).

[16] Le tre tassellazioni sono state eseguite in base ai seguenti criteri: aggregazione automatica dei comuni con almeno 13 antenne per zona (313 zone); aggregazione manuale in base agli "ambienti insediativi" della ricerca Itaten, tenendo quindi conto delle caratteristiche insediative (202 zone); clustering delle antenne (526 zone). Ogni zona è un'aggregazione di tasselli di Voronoi ottenuti a partire dai punti di localizzazione delle antenne. I raggruppamenti dei tasselli corrispondono al raggruppamento delle coordinate delle antenne ottenuto tramite clustering gerarchico. La zonizzazione finale è stata ottenuta calibrando l'algoritmo in modo da ottenere dei cluster sufficientemente equilibrati.

[17] La distribuzione spaziale delle antenne dipende dalla quantità di traffico telefonico che deve essere gestito; pertanto la densità è moto alta nelle aree urbane e negli ambiti altamente urbanizzati, diversamente dalle zone agricole e scarsamente abitate.

[18] Le mappe interattive sono consultabili in www.ladec.polimi.it/maps/od/fluxes.html

di mobilità, concorrendo a costruire conoscenza utile anche per gestire in modo più efficace ed equo l'offerta di servizi urbani e di trasporto.

In questa prospettiva, un esempio sull'utilità di una mappatura in tempo reale della geografia dei flussi e della loro variabilità, offerta dalla nuova fonte, riguarda la possibilità di riconoscere il modificarsi, nelle diverse ore del giorno, dei confini di attrattività dei principali centri urbani, come anche di individuare poli di attrattività che variano nell'arco della giornata.

Si tratta di informazioni utili per la gestione dell'offerta di servizi per la mobilità, ma anche per determinare i perimetri d'azione di alcune politiche urbane, tra cui le politiche tariffarie.

Infatti se si sovrappone il perimetro della gestione istituzionale del trasporto pubblico locale in Milano alle aree di influenza del capoluogo, definite in base ai flussi di traffico dei telefoni cellulari con destinazione Milano (fig. 4), possiamo constatare una discrepanza evidente tra ambiti di gestione del trasporto pubblico (Milano e i comuni di prima cintura) e l'ambito di attrattività del capoluogo.

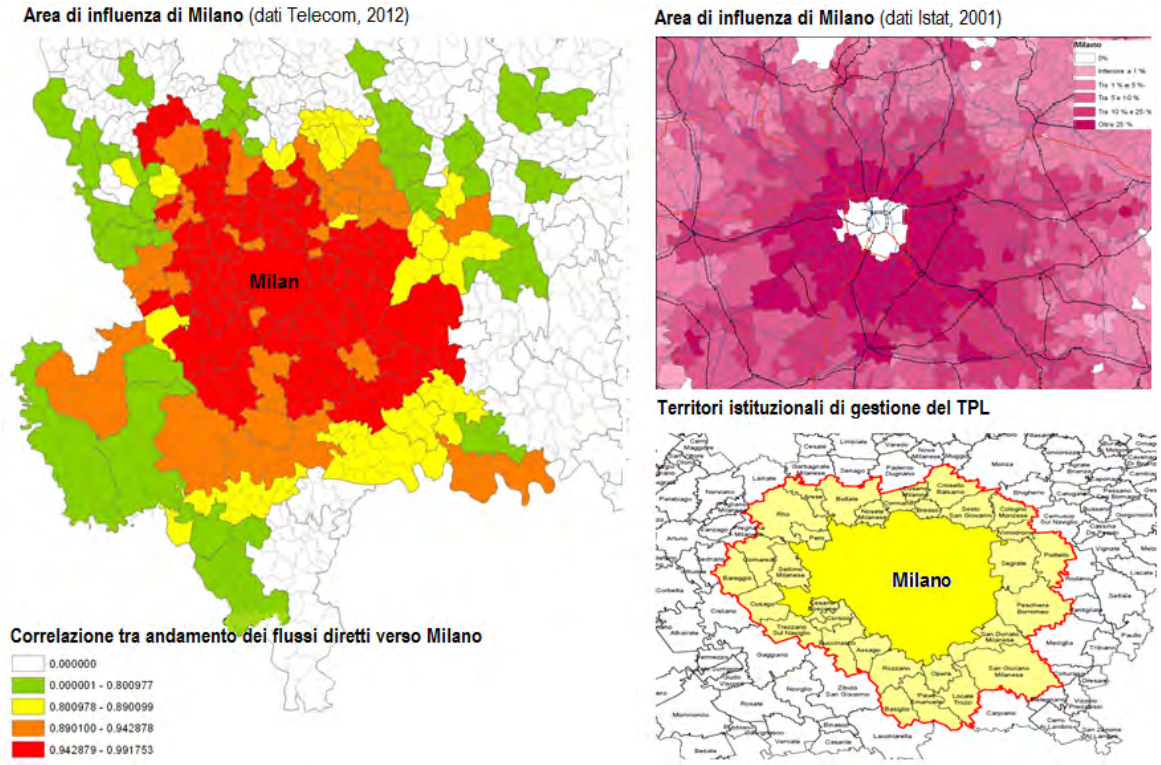

Fig. 4 Area di influenza di Milano con dati Telecom (sx) e dati Istat (dx) e il perimetro di gestione istituzionale del trasporto pubblico locale

Se tale fenomeno è da tempo noto anche in ragione degli "effets profondément structurants (ou déstructurants) de la mobilité des personnes sur les territoires politiques " (Estèbe, 2008, p. 6), meno scontata è la capacità di definire perimetri pertinenti per cogliere pratiche giornaliere di mobilità non solo pendolare, ma anche di *city users* (quindi più variabili nell'arco della giornata) che usano intensamente le reti della mobilità urbana e su questi ridefinire, con migliore efficacia, le politiche di tariffazione dei servizi di trasporto pubblico urbano. Possibilità che i dati di traffico telefonico consentono di garantire.

Va infatti ricordato che nella città di Milano – secondo una ricerca condotta da Pola e Ferri (2012) - 8,5% del budget comunale è destinato a coprire i costi dell'offerta di servizi urbani, tra cui un peso rilevante si ritaglia il trasporto pubblico. Del prezzo "politico" del biglietto di trasporto (1,5 euro a biglietto urbano) beneficiano

non solo i residenti, ma anche i *city users*, i pendolari, le popolazioni temporanee che usano intensamente la rete del trasporto pubblico milanese. Questi ultimi non concorrono a coprirne i costi, poiché non sono interessati dalla tassazione locale, non risiedendo a Milano.
Reciprocamente, le popolazioni temporanee usano i servizi urbani, governati da una amministrazione locale di una città in cui non vivono e non votano; condizione che Martinotti ha efficacemente sintetizzato con riferimento al "paradosso del voto" (Martinotti, 1993, p. 163).
Se cioè i confini amministrativi rimangono i prerequisiti per l'allocazione delle risorse e degli interventi, in alcune condizioni, come quella evocata prima e in un regime di finanziamenti pubblici sempre più scarsi e di razionalizzazione dei servizi, la nuova configurazione di ambiti di fiscalità locale, definiti sulla base di confini variabili, costruiti sulle pratiche mutevoli che i dati di telefonia mobile possono restituire, diventa una misura non derogabile, oltre che capace di ripartire più equamente i costi di un servizio pubblico essenziale.

4 PROSPETTIVE E LIMITI DEI DATI DI TRAFFICO TELEFONICO PER LE POLITICHE URBANE

Lontani dal ricercare un determinismo analitico che consenta di fotografare la realtà delle pratiche d'uso dello spazio, utilizzando fonti quali la telefonia mobile, le elaborazioni prodotte hanno inteso valutare le potenzialità di una nuova fonte dati nel restituire la dimensione spaziale di pratiche d'uso, variabili nell'arco della giornata, che grande impatto hanno sulle densità d'uso della città e dei suoi servizi.
Se "certe tracce possiedono un valore individualizzante (…) ossia segnalano la presenza di una persona che ne è all'origine e che vi è implicata" (Ferraris, 2009, p. 336), nella nostra ricerca queste "tracce idioma", desunte dalle attività telefoniche, non collegano a un individuo, ma a "comunità di pratiche" proprio per la natura dei dati utilizzati che offrono cioè comportamenti aggregati legati alla intensità d'uso del telefono.
Questo implica considerare i dati di traffico telefonico come l'effetto di comportamenti e abitudini individuali che diventano, aggregati, un'informazione sulle caratteristiche del territorio, in qualche modo, una sua intrinseca proprietà, che varia nel tempo.
In questa prospettiva, le mappe prodotte a partire dai dati di telefonia mobile rappresentano i territori delle comunità di pratiche che generano dei perimetri contingenti, dei confini cioè che esprimono un valore relazionale, che sono variabili nel tempo in ragione delle dinamiche che si intendono cogliere e regolare.
Definire perimetri d'azione pertinenti per trattare la variabilità e l'interconnettività delle relazioni, la multiscalarità delle pratiche spazializzate che le categorie amministrative e le divisioni istituzionali dello spazio non riescono a trattare, è un tema da tempo al centro delle riflessioni nell'ambito dello *Spatial Planning*.
Se vi è consenso sulla necessità di costruire perimetri d'azione pertinenti sulla base dei quali proporre una diversa articolazione delle competenze e delle risorse che favoriscano una regolazione delle pratiche e la generazione di nuovi *frames*, necessari alla innovazione dei processi di governo (Healey, 2006, p. 1531), la sfida si pone in termini di strumenti interpretativi per riconoscerli.
I contenuti e le dimensioni principali di nozioni come *Soft spaces* (come spazi trasversali) e *Fuzzy boundaries*[19] (come perimetrazioni fluide) raccolgono infatti consenso, anche in ragione delle loro caratteristiche fondanti[20], capaci di declinare "the new post-devolution spaces of planning" (Haughton et al., 2010).

[19] Fuzzy boundaries "are used to define functional regions which do not conform to known political or administrative units" (Heley, 2012, p. 6).

[20] I *Soft spaces* hanno quattro caratteristiche principali (Haughton and Allmendinger 2008) :
– " They are representative of a deliberate attempt to generate new thinking and insert new models of public engagement (…);

Meno scontate sono le modalità con cui definire perimetrazioni fluide e le ricadute operative in termini di rapporti con perimetri istituzionali che orientano e governano il comportamento spaziale individuale e collettivo e a cui corrispondono poteri e competenze consolidati.

Le considerazioni proposte a partire dal trattamento dei dati di traffico telefonico e in riferimento alle politiche per la mobilità, hanno dunque la finalità di suggerire un processo induttivo per mappare territori contingenti, utili per individuare misure tese a migliorare l'efficacia dei servizi e a rispondere a domande emergenti.

Avviare un processo induttivo rappresenta la condizione necessaria non solo per riconoscere e per nominare i territori delle pratiche, ma anche per operare un "re-scale" nelle gerarchie di intervento, quindi per governare processi dinamici, pur non rinunciando a un confronto con confini amministrativi istituzionali dati.

Infatti le politiche costruite sui territori contingenti sono "irriducibili a ogni formalizzazione tradizionale e, in definitiva, mettono in discussione la stessa modalità ordinaria di definizione e di trattamento delle politiche pubbliche" (Pasqui, 2008, p. 149).

Nel rapporto tra territori contingenti e territori istituzionali, i problemi legati alla variabilità temporale delle pratiche all'origine dei perimetri osservati, come quelli dei meccanismi di rappresentanza politica delle comunità di pratiche restano ancora irrisolti.

Tuttavia il riconoscere territori contingenti come espressione di pratiche d'uso del territorio, dei suoi servizi e delle sue infrastrutture che i dati di traffico telefonico consentono, rappresenta una condizione necessaria per le politiche urbane se si intende "prender atto che oggi una governabilità urbana che voglia essere efficace deve essere limitata, intrinseca ai processi e quindi capace di cogliere e valorizzare le sinergie tra interventi settoriali e le potenzialità offerte dal mutare delle situazioni catalizzatrici dei diversi interessi in gioco. Ciò che non significa affatto rinunciare a governare e quindi a ricomporre la città" (Dematteis, 2012).

Nel caso specifico, le caratteristiche dei dati di traffico telefonico, poiché consentono di restituire la variabilità delle pratiche d'uso del territorio, rendono i dati stessi una fonte promettente per contribuire a individuare quelle che Dematteis chiama "situazioni catalizzatrici dei diversi interessi in gioco". E, d'altronde, l'esempio riferito all'area di attrattività di Milano, generata a partire dal trattamento dei dati di traffico telefonico (fig. 4), restituisce le potenzialità di questa fonte nell'offrire conoscenze utili anche per migliorare l'efficacia, la qualità e l'equità delle politiche per la mobilità.

Se si condivide la condizione che "tous les gouvernements territoriaux vivent sous un régime permanent de dissociation entre les citoyens, les habitants et les usagers de la ville" (Estèbe, 2008, p. 17), la possibilità di riconoscere le diverse popolazioni urbane e i territori delle loro pratiche, attraverso il trattamento dei dati di traffico telefonico, può rappresentare una condizione utile per avviare processi di "re-scale" e di costruzione di nuove geografie di *partnerships* tra i differenti soggetti coinvolti nella costruzione di politiche urbane.

- They are not antithetical to hard spaces, but are intended to work alongside, augment and where more expeditious challenge existing institutional frameworks and practices ;
- They are becoming more important and more numerous as part of the changing institutional landscape of spatial planning ;
- They are predominately defined (or not) in a fluid fashion, and with reference to fuzziness, in order that they are more amenable to shifting range of issues and actors, involved in spatial planning projects .

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IMAGES SOURCES

Fig. 1: elaborazioni DAStU, Politecnico di Milano di dati Telecom Italia

Figg. 2, 3: elaborazioni MOX/DAStU Politecnico di Milano di dati Telecom Italia

Fig. 4: elaborazioni DAStU, Politecnico di Milano di dati Telecom Italia (2012) e Istat (2001)

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SMART MOBILITY

OPPORTUNITÀ E CONDIZIONI

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ABSTRACT

Smart mobility is often presented, in the strategies for smart cities that public institutions and private big players are promoting, as one of the main options, if not "the option", to pursue more sustainable transport systems.

Most of the opportunities of smart mobility are related to technological innovations for managing and organizing trips and traffic and for improving the environmental efficiency of vehicles; but the impacts of these innovations, in particular over the long term, depend on how they are embedded by the users in their daily activities and practices.

These "boundary conditions" are often disregarded, just as they generally concern not a technological dimension, but the psychological-cognitive and socio-cultural domain. The paper tries to analyze these boundary conditions, which opportunities they can support and which risks can emerge if they are not fulfilled.

It also tries to argue, by some experiences from the case of Turin (an Italian city that is considered at the cutting edge of smart mobility), why at the heart of smart mobility policies there should be citizens instead of technologies, and why these policies should be supported and integrated by other measures and policies (for transports, urban planning, education and so on) in order to influence the behavior and the choices of these citizens.

KEYWORDS:
Smart mobility; smart city; intelligent transportation systems; Torino

1 *SMARTNESS* E SOSTENIBILITÀ

La *smart mobility* costituisce una componente ricorrente nei discorsi sulla *smart city*. Rappresenta uno dei sei assi su cui è strutturato il concetto di *smart city* nella fondativa ricerca condotta dalle università di Vienna, Delft e Lubiana (Giffinger *et al.* 2007). Rientra tra gli ambiti principali dell'iniziativa "Smart cities and communities" lanciata dall'Unione europea nel 2011, ed è uno dei settori finanziati nei bandi connessi. Tra le sedici aree tematiche del programma "Smart cities and communities and social innovation", promosso dal MIUR nel 2012, due sono rappresentate da "Smart mobility" e "Last mile logistic". Nelle strategie sulla *smart city* promosse da *big player* privati come ABB, Cisco, Finmeccanica, IBM, Siemens, la *smart mobility* costituisce sempre un tema portante.

Alla base di questa centralità vi sono almeno due fattori. In primo luogo, la mobilità gioca un ruolo molto significativo nei consumi energetici, che costituiscono la dimensione ambientale principale, se non in alcuni casi quasi esclusiva, presa in considerazione nei discorsi sulla *smart city* (Toldo 2013). Limitandosi all'area dell'Unione europea a 27, nel 2010 il settore dei trasporti ha contribuito per oltre il 30% ai consumi energetici totali (di tale quota, oltre il 90% deriva da fonti non rinnovabili) e per il 25% alle emissioni di gas ad effetto serra (European Commission 2012); a sua volta, la mobilità specificamente urbana incide per il 40% sulle emissioni di CO_2 dei trasporti (Commissione europea 2007).

In secondo luogo, da ormai trent'anni il settore dei trasporti è già ambito privilegiato di applicazione di innovazioni legate alle ICT, volte a sviluppare i cosiddetti *Intelligent Transportation Systems* (ITS), e dunque la ricerca di una maggiore *smartness* nella mobilità è tutto meno che una novità (Ambrosino, Boero, Nelson, Romanazzo 2010); i risultati finora raggiunti dagli ITS restano però in gran parte frammentari, eterogenei e poco interoperabili, al punto che la Commissione europea ha adottato nel 2008 un Piano d'azione e nel 2010 una Direttiva con l'obiettivo principale di armonizzare, su standard comuni, gli ITS operanti in tutto il territorio dell'Unione. E proprio perché poco "maturo", il mercato di questi sistemi è estremamente interessante per le grandi compagnie delle ICT: secondo stime recenti (Markets, Markets 2012), a livello globale potrebbe crescere tra il 2012 ed il 2017 ad un tasso annuo del 12%, fino a sfiorare i 25 miliardi di dollari.

Benché dunque non costituisca una novità, il concetto di *smartness* applicato alla mobilità riflette quella vaghezza che si ritrova nella stessa definizione di *smart city* e che è già stata evidenziata in molti studi (si vedano, ad esempio, Caragliu, Del Bo, Nijkamp 2009; Papa, Gargiulo, Galderisi 2013). Due sono le principali accezioni che si trovano riferite all'espressione *smart mobility*:

- un sistema di mobilità efficace ed efficiente;
- un sistema di mobilità caratterizzato da un consistente e sistematico utilizzo di innovazioni tecnologiche, sia in termini di ICT (impiegate per fornire informazioni a chi si sposta, per fluidificare il traffico, per gestire le flotte del trasporto pubblico, per migliorare la logistica del trasporto merci ecc.), sia in termini di mezzi di spostamento (auto elettriche, *bus on demand*, *bike* e *car sharing* ecc.).

La prima definizione è indipendente dal ruolo giocato dall'innovazione tecnologica nel perseguire l'efficacia e l'efficienza del sistema di mobilità; o, meglio, fa riferimento all'uso di tecnologie "appropriate", più che necessariamente "di punta". Ad esempio, nei cataloghi di casi di eccellenza di *smart cities* (si veda, ad esempio, Cittalia 2012) è molto spesso inclusa Curitiba, città brasiliana la cui *smartness* viene attribuita soprattutto all'ottimo sistema di trasporto pubblico, basato su una rete di corridoi riservati agli autobus che possono viaggiare con alte frequenze e velocità commerciali: una soluzione molto efficace ed efficiente, ma del tutto *low tech* (e scelta proprio perché richiedeva investimenti limitati, non avendo la città le risorse finanziarie necessarie per realizzare un sistema di metropolitana).

La seconda definizione, viceversa, assegna un ruolo centrale alle tecnologie "di punta", più innovative (e in particolare alle ICT), a volte anche a prescindere da un'effettiva valutazione del rapporto costo/benefici del loro utilizzo (soprattutto in termini comparativi rispetto a soluzioni più tradizionali), trascurando il fatto che, come già è stato evidenziato per la *smart city* in generale (Morelli *et al.* 2013), non necessariamente *smartness* è sinonimo di sostenibilità. È però questa l'accezione oggi dominante nei discorsi e nelle strategie sulla *smart mobility*, e non solo dei *big player*[1]: anche i finanziamenti dell'Unione europea e del MIUR sono prevalentemente orientati a promuovere soluzioni ai problemi della mobilità in termini di innovazioni tecnologiche, se non altro per le ricadute economiche che esse possono generare[2]. Questa enfasi generalizzata su una *smart mobility* così intesa rischia di determinare l'appiattimento su un'unica visione tecno-centrica della città, in cui il ricorso alle tecnologie più innovative nel settore dei trasporti può apparire come quello che, nella *actor-network theory*, viene definito un "punto di passaggio obbligato" (Callon 1986) verso una mobilità più sostenibile.

Se diffusa è l'esaltazione delle opportunità offerte dalla *smart mobility*, sono invece spesso trascurate le "condizioni al contorno" perché esse si realizzino, anche perché tali condizioni sono per lo più esterne alla dimensione prettamente tecnologica, e connesse invece ad aspetti inerenti la sfera psicologico-cognitiva, quella socio-culturale, quella delle politiche settoriali e intersettoriali. Anche in questo caso, si riflette un nodo problematico già evidenziato più in generale per la *smart city*: una città non può essere considerata *smart* solo perché consuma meno energia o è costruita con materiali riciclabili, senza considerare il ruolo che vi giocano i processi di partecipazione, di costruzione del capitale umano, di formazione, di apprendimento sociale (Papa 2013).

Nelle pagine che seguono si proverà allora a mettere in evidenza quali sono le condizioni per una mobilità davvero *smart*, quali le opportunità che esse possono favorire e quali invece i rischi che possono presentarsi nel caso esse non si verifichino, in relazione alle pratiche individuali (par. 2), agli aspetti sociali (par. 3) e alle politiche settoriali e territoriali promosse dalle amministrazioni pubbliche (par. 4).

In quest'analisi, si farà più volte riferimento al caso di Torino, che è particolarmente interessante dal punto di vista della *smart mobility* (Staricco 2012). Da un lato, infatti, può vantare un'esperienza quasi trentennale nell'ambito dei sistemi ITS[3], è all'avanguardia a livello italiano nel *bike* e *car sharing*, partecipa a due dei progetti sulla *smart mobility* finanziati dal MIUR nel recente bando del 2012, ha una forte specializzazione produttiva nel settore dei mezzi di trasporto ed è sede di un distretto tecnologico ICT. Dall'altro lato, la città si trova ad affrontare criticità ambientali particolarmente accentuate, in buona misura legate proprio alla mobilità: secondo il database *Airbase* dell'Agenzia europea dell'ambiente, nel periodo 2004-08 Torino risulta la penultima tra le 221 città europee censite per qualità dell'aria, dopo la bulgara Plovdiv, e nel caso delle micropolveri e degli ossidi di azoto il traffico stradale sarebbe il primo responsabile; secondo stime dell'Arpa

[1] Si possono riscontrare di frequente, nei siti e negli studi promossi da queste aziende, affermazioni che pongono l'innovazione *smart* come l'unica via per migliorare i sistemi di mobilità, come la seguente (contenuta nel rapporto *Smart mobility. Muoversi meglio per vivere meglio*, promosso da Finmeccanica): l'evoluzione verso la *smart mobility* "non è un passaggio teorico o una scelta opzionale; è un processo inevitabile e urgente" (The European House – Ambrosetti 2012, p. 35).

[2] La Commissione europea indica esplicitamente, tra le motivazioni alla base del suo Piano d'azione per gli ITS, quella di "potenziare il ruolo guida dell'industria europea degli ITS sui mercati mondiali, promuovendo l'offerta di prodotti e servizi innovativi ai costruttori di veicoli, agli operatori del trasporto, alle imprese di logistica e agli utenti" (European Commission 2008, p. 13).

[3] A partire dal 1984 Torino sperimenta il primo sistema in Italia di monitoraggio e controllo del trasporto pubblico; nel 1985 con il "Progetto Torino" sviluppa il primo sistema pilota di controllo semaforico intelligente. Questi primi progetti evolvono e confluiscono nel 1992 nel progetto 5T - *Tecnologie Telematiche Trasporti Traffico Torino*, consorzio pubblico/privato sviluppato nell'ambito del programma europeo Quartet (cui Torino partecipa con Birmingham, Atene e Stoccarda); dal 2008 diventa un Srl, con l'uscita dei soci privati e l'ingresso, accanto a GTT (che ne detiene il 35%), di Regione Piemonte (30%), Comune di Torino (30%) e Provincia di Torino (5%). Oggi 5T opera in due principali ambiti d'azione, entrambi connessi all'applicazione di tecnologie ICT al settore della mobilità: da un lato la fluidificazione e regolamentazione del traffico, dall'altro le informazioni agli utenti.

Piemonte, il 45% della popolazione torinese di giorno e il 67% di notte sarebbe esposto a livelli di rumore superiori alle soglie di legge, nel 92,6% dei casi a causa del traffico stradale. In altre parole, Torino sembra costituire un caso interessante per capire se una mobilità *smart* è anche, e in che misura, sostenibile.

2 *SMART MOBILITY* E PRATICHE INDIVIDUALI

L'impatto delle ICT sui trasporti è stato spesso sovrastimato in passato. Geels & Smit (2000) hanno passato in rassegna molti studi che hanno provato a valutare quali impatti avrebbe avuto sul traffico e sull'efficienza dei sistemi di trasporto l'introduzione di nuove forme di ICT, sia in termini diretti (ad esempio, i sistemi di navigazione satellitare e le informazioni sugli spostamenti) sia indirettamente (a seguito della diffusione del telelavoro, delle teleconferenze, del commercio elettronico ecc.): le stime analizzate sono risultate sistematicamente e significativamente superiori rispetto ai cambiamenti che si sono effettivamente realizzati. Gli autori individuano diverse motivazioni alla base di queste errate previsioni, in gran parte legate ad una mancata considerazione delle dinamiche e pratiche sociali attraverso cui le nuove tecnologie vengono adottate dagli utenti: ad esempio, si ipotizza che tali tecnologie siano usate in sostituzione delle precedenti (e non in complementarità con esse), si trascurano le nuove attività che possono emergere dalla loro diffusione, si tengono in conto solo gli aspetti funzionali (e non anche quelli psicologici e sociali) del loro utilizzo, si assume che il processo del loro *embedding* nella società non presenti problematicità.

Questi fattori non andrebbero trascurati nel valutare il potenziale futuro della *smart mobility*. Nel suo Libro bianco sui trasporti del 2001, la Commissione europea stimava che gli ITS avessero un potenziale di riduzione dei tempi di spostamento dell'ordine del 20% e di aumento della capacità della rete del 5-10%, alla luce dei risultati ottenuti in alcune sperimentazioni condotte nel decennio precedente in certe città. Nel più recente Libro bianco del 2011, così come nei già citati Piano d'azione per gli ITS del 2008 e Direttiva del 2010, la Commissione europea si è mostrata assai più prudente, evitando di esplicitare una valutazione degli effetti previsti dall'armonizzazione e diffusione dei vari sistemi ITS sui trasporti nel territorio dell'Unione.

In effetti, stimare tali effetti non è semplice almeno sul lungo periodo, proprio per gli aspetti psicologici-cognitivi e socio-culturali connessi all'utilizzo degli ITS. Si pensi ad una delle più esaltate potenzialità della *smart mobility*, quella connessa alle informazioni che possono essere fornite tramite le ICT agli individui sia prima sia durante lo spostamento, perché possano ottimizzarne l'organizzazione (nella scelta del mezzo, degli orari, dei percorsi): queste informazioni dovrebbero avere effetti importanti sulla congestione, perché permetterebbero agli automobilisti di scegliere volta per volta, in tempo reale, i percorsi meno trafficati. Si trascura però che questi effetti positivi si limitano in genere al breve termine, mentre possono annullarsi sul medio-lungo termine. È stato evidenziato (Adler 2001), ad esempio, come i navigatori satellitari, nel caso offrano indicazioni di percorso "off-line" senza considerare i livelli di traffico presenti sulla rete in tempo reale, comportino vantaggi per l'utente soprattutto in contesti in cui si trova a guidare per le prime volte; più migliora nel tempo la conoscenza del contesto, meno il guidatore tende a fare affidamento sul navigatore e più invece su riferimenti fisici e mnemonici come i *landmark*. Nel caso di navigatori che invece monitorano le condizioni di traffico in tempo reale, i vantaggi per l'utente possono mantenersi anche sul medio-lungo periodo, ma non è detto che questo sia vero a livello di domanda di trasporto complessiva. Come è emerso da più studi[4], nel corso della storia è rimasto pressoché immutato il tempo medio giornaliero dedicato dagli individui agli spostamenti: tra i 70 ed i 90 minuti, quasi si trattasse di un bisogno, quello di "muoversi", antropologicamente strutturale all'essere umano. È la cosiddetta "costante di Marchetti", dal nome dell'antropologo che per primo l'ha riscontrata: quando un progresso tecnologico aumenta la velocità media a cui è possibile muoversi, gli individui sfruttano generalmente il tempo risparmiato nei loro spostamenti non

[4] Si vedano, ad esempio, Marchetti (1994); Zahavi, Ryan (1980).

per svolgere altre attività, ma per compiere un numero maggiore di spostamenti o per allungare la distanza media di quelli che già compiono. Si tratta di un fenomeno già emerso in termini infrastrutturali: il tentativo di risolvere i problemi di congestione attraverso un potenziamento dell'offerta di trasporto viene vanificato dall'elasticità della domanda, con nuovo traffico "indotto" che torna a congestionare le nuove strade o quelle esistenti ampliate (Gorham 2007; Plane 1995). Lo stesso meccanismo potrebbe riprodursi a seguito dell'uso degli ITS: la fluidificazione del traffico che essi possono determinare sul breve periodo potrebbe generare un incremento della domanda di mobilità, che a sua volta ridurrebbe sul lungo termine gli effetti positivi degli stessi ITS sulla congestione[5].

Un'altra prospettiva centrale della *smart mobility* è rappresentata dall'innovazione tecnologica dei veicoli, che permetterebbe di ridurne gli impatti ambientali in termini, in particolare, di inquinamento atmosferico e di contributo all'effetto serra. Da questo punto di vista, l'innovazione ha svolto in questi ultimi decenni un ruolo fondamentale. Ad esempio, le emissioni di ossido di zolfo e di azoto dei veicoli Euro 5 attualmente immatricolati sono inferiori di oltre l'80% rispetto a quelle degli Euro 0 che venivano venduti vent'anni fa, ma la riduzione di questi inquinanti atmosferici che si è effettivamente realizzata a livello di Unione europea è stata limitata a circa un 20% (European Environment Agency 2013); una buona parte degli effetti positivi dell'innovazione tecnologica è stata non solo rallentata dai tempi lunghi del rinnovo del parco veicolare (tempi che crescono ulteriormente in questa fase di crisi economica e di forte contrazione dei consumi), ma anche, per così dire, vanificata dall'incremento dei chilometri percorsi dai veicoli, nonché dall'aumento del loro peso medio e della loro potenza, che incidono fino al 40% sui consumi e sulle emissioni. L'automobile continua infatti ad essere vista come uno status symbol, in particolare in relazione alla sua potenza[6]: in provincia di Torino, ad esempio, la quota di autovetture con cilindrata inferiore ai 1.200 cc è scesa dal 37,8% del 2002 al 22,1% del 2011, mentre è cresciuta dal 19,6% al 24,1% quella relativa a cilindrate superiori ai 1.800 cc.

In altre parole, un approccio prevalentemente incentrato sulla diffusione di tecnologie innovative per la mobilità rischia di avere effetti limitati in termini di miglioramento della sostenibilità, se non tiene conto delle dinamiche individuali e sociali attraverso cui tali tecnologie vengono integrate nei comportamenti di mobilità dei cittadini.

3 *SMART MOBILITY* ED EQUITÀ SOCIALE

Molti degli impatti negativi dei trasporti sull'ambiente, sulla società e sull'economia non sono costi "interni", sostenuti direttamente da chi compie gli spostamenti (attraverso il pagamento del carburante, delle tariffe autostradali, delle tasse automobilistiche, dei biglietti del trasporto pubblico ecc.), bensì costi esterni, che ricadono su tutta la collettività. Secondo alcune stime, questi costi esterni rappresenterebbero circa un terzo dei costi totali del sistema dei trasporti (Lombard, Molocchi, Buscema, Molinario 2005). Come si è detto, oltre il 90% di questi costi sono generati dal trasporto motorizzato privato, che gode quindi di un vantaggio

[5] Non solo, nella loro impostazione volta a distribuire i flussi in primis sulle strade meno trafficate, gli ITS possono "consigliare" agli automobilisti di percorrere strade secondarie, che finiscono così per diventare pericolose perché non progettate per ospitare i flussi consistenti che si generano quando sono in molti a seguire le indicazioni dei navigatori: in provincia di Torino, ad esempio, la strada provinciale 147 presso Lombriasco e Pancalieri ha registrato recentemente un aumento di traffico insostenibile data la sua sezione, proprio perché proposta dai navigatori in alternativa alla vicina sovraffollata statale 663 ("La strada che piace ai GPS. Era deserta, ora c'è la coda", *La Stampa*, 22 aprile 2013).

[6] Anche l'aggressività nella guida può avere un'incidenza significativa: uno stile di guida corretto può ridurre i consumi di un 10-20% (Barth, Boriboonsomsin 2009).

comparativo rispetto agli altri modi di trasporto, i cui costi effettivi sono sostenuti in percentuale maggiore dagli utenti[7].

Una delle strategie su cui punta l'Unione europea per favorire il riequilibrio modale consiste nell'internalizzazione di questi costi esterni dei trasporti, secondo il principio "chi inquina paga": chi effettua uno spostamento dovrebbe pagare direttamente non solo i costi interni, come già avviene, ma anche quelli esterni, senza che debba farsene carico la collettività. Questa strategia è finora stata orientata in primis sul trasporto merci, a partire dal cosiddetto "Greening transport package" adottato nel 2008 e finalizzato a creare un sistema di telepedaggio (interoperabile tra i diversi Stati membri dell'Unione) per imporre ai veicoli merci pesanti tariffe differenziate proporzionalmente agli impatti generati dai loro spostamenti. Nel Libro Bianco sui trasporti del 2011, la Commissione europea ha posto l'obiettivo per il 2020 di "procedere alla piena e obbligatoria internalizzazione dei costi esterni (comprendente, oltre al recupero obbligatorio dei costi di usura, anche i costi relativi all'inquinamento acustico e atmosferico e alla congestione) nel trasporto stradale" (p. 33), anche in ambito urbano, sia per i veicoli commerciali sia per le autovetture.

Finora, nel caso del trasporto passeggeri le esperienze di *road pricing* e *congestion charging* sono state applicate soprattutto nelle aree centrali delle città o su determinate tratte stradali molto congestionate, con l'obiettivo di ridurne i livelli di congestione (Anas, Lindsey 2011). Le prime esperienze sono state condotte a Singapore dagli anni Settanta e successivamente si sono moltiplicate, dal caso di Londra a quello più recente in Italia della cosiddetta "area C" di Milano. In una prospettiva di *smart mobility*, le tecnologie ICT applicate ai trasporti offrono l'opportunità di ampliare e generalizzare l'internalizzazione dei costi esterni attraverso una tariffazione sistematica degli spostamenti, estesa su tutto il territorio (Maerivoet *et al.* 2012): i Paesi Bassi sono stati i primi, nel 2010, ad avviare un percorso in questa direzione. Grazie a *smart card* e navigatori satellitari, ognuno pagherebbe per ogni singolo spostamento motorizzato una tariffa differenziata, modulata in modo da tener conto di parametri quali orario, livello di congestione, tipo di veicolo e di infrastruttura utilizzati, sensibilità delle aree attraversate agli impatti dell'inquinamento atmosferico e acustico (in relazione a densità residenziale e qualità ambientale).

Uno dei problemi finora irrisolti delle misure di *pricing*, siano esse applicate alla circolazione o alla sosta, è la non equità sociale, dal momento che le tariffe non sono generalmente modulate in base al reddito dei singoli (Levinson 2010). Un'applicazione diffusa e sistematica di tali misure sembrerebbe poter esasperare questo limite, ma in realtà le stesse ICT offrono l'opportunità di differenziare le tariffe e quindi di ridurre tali criticità. La città di Tallinn, capitale dell'Estonia, ha introdotto dal 2004 un sistema di pagamento del trasporto pubblico denominato *ID-ticketing*, basato sulle carte di identità elettroniche diffuse a livello nazionale dal 2002 e dotate di un microchip che registra alcuni dati del cittadino. L'utente del trasporto pubblico può attivare il proprio biglietto elettronico tramite una chiamata con il cellulare o su Internet, semplicemente inserendo il codice della propria carta d'identità: la tariffa viene automaticamente personalizzata per diverse categorie individuate a partire dai dati delle carte d'identità (per ora studenti, mamme con tre o più figli, anziani, disabili; in prospettiva, sulla base di indicatori analoghi all'Isee italiano).

[7] Occorre tenere in conto, inoltre, che nel caso dell'auto la quota più importante dei costi è concentrata in pochi momenti (l'acquisto all'inizio, i pagamenti annuali di assicurazione, bollo e tagliandi ecc.) e non viene percepita viaggio per viaggio, diversamente rispetto alla tariffazione del biglietto per una singola tratta del mezzo pubblico. Questa mancata percezione fa erroneamente apparire l'uso dell'auto meno costoso rispetto ad altri modi; non a caso, è stato riscontrato che gli abbonati al *car sharing* (servizio in cui la tariffa per chilometro e per ora è fissata in modo da distribuire sui singoli spostamenti anche i costi di ammortamento, assicurazione, manutenzione ecc. del veicolo) tendono in genere a utilizzare l'auto condivisa per percorrenze inferiori rispetto a quando possedevano un'auto in proprietà, e viceversa utilizzano maggiormente il mezzo pubblico. Ad esempio, nel caso di Torino gli utenti percorrevano in media 11.000 km all'anno con la propria auto prima di aderire al *car sharing*, oggi usano invece il mezzo privato per 8.190 km, l'auto condivisa per 420 km e altri modi per 2.390 km (Romano 2011).

In provincia di Torino è in fase di introduzione, dal 2012, il Biglietto Integrato Piemonte BIP, un sistema di bigliettazione elettronica regionale basato su tecnologia *smart card contactless*, in cui una carta prepagata costituisce il supporto per gli abbonamenti (annuali, mensili, settimanali) al mezzo pubblico e sarà progressivamente estesa per vari servizi di mobilità (*car-sharing*, *bike-sharing*, pedaggi autostradali, eventuali futuri pedaggi per accedere alla ZTL ecc.). Proprio il BIP potrebbe diventare lo strumento per misure di *pricing* generalizzate della mobilità modulate in base al reddito.

Se la *smart mobility* apre dunque interessanti possibilità di riduzione delle iniquità sociali, al tempo stesso presenta però dei rischi di fondo, che potrebbero finire invece per esasperarle a causa del cosiddetto *digital divide*. Com'è noto, l'accesso alle ICT e il loro utilizzo non è oggi uniformemente distribuito tra i vari gruppi sociali[8]: nel caso del Piemonte, ad esempio, le ultime rilevazioni condotte dall'Osservatorio ICT del Piemonte (2012) hanno evidenziato come permangano fortissime differenze nell'utilizzo di Internet a sfavore delle persone più anziane e dei gruppi più deboli in termini di istruzione e di reddito; queste differenze si accentuano se in particolare si considera l'accesso ad Internet tramite gli *smartphone* (figura 1), che sono destinati a diventare in prospettiva lo strumento principale per accedere alle informazioni sulla mobilità, e che gli anziani trovano particolarmente difficili da usare, a causa della struttura *nested* dei loro menu (Hodgson 2012).

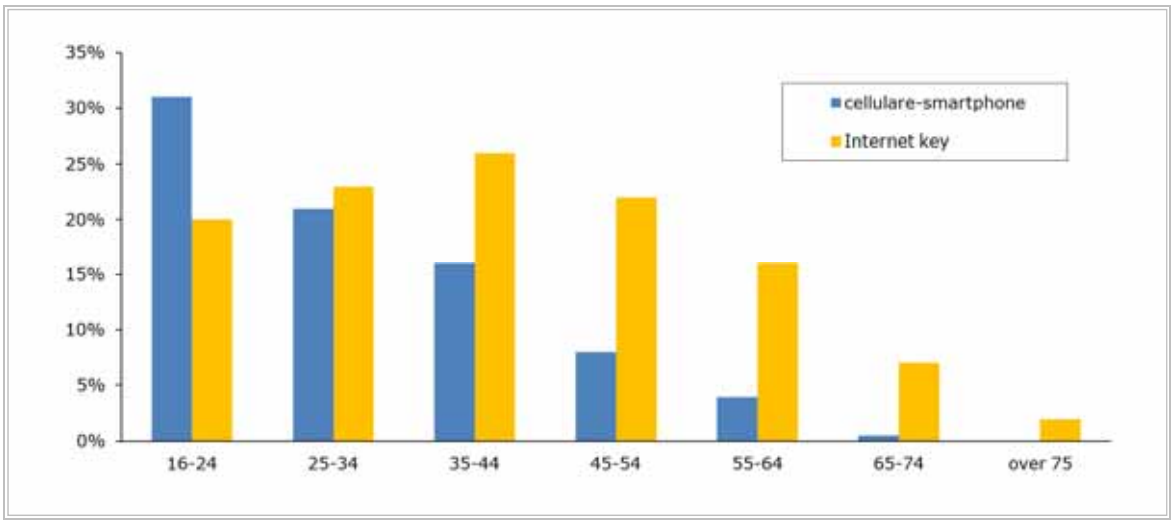

Fig. 1 - Utilizzo di cellulare e Internet key per connettersi a Internet per fascia di età, 2010 (base: tutti i cittadini piemontesi)

In una società che è già oggi, e sempre di più sarà sul medio e lungo termine, caratterizzata dal fenomeno dell'*ageing*, l'alfabetizzazione informatica costituisce una precondizione essenziale perché una mobilità sempre più *smart* non determini un'accentuazione della polarizzazione sociale, anziché l'auspicata sua riduzione. Rischio tanto più centrale nel caso della mobilità, in quanto il *digital divide* si caratterizza, oltre che per una dimensione sociale, anche per una dimensione spazio-territoriale strettamente intrecciata alla prima: numerosi studi hanno evidenziato la correlazione esistente tra ridotta accessibilità, minore dotazione di infrastrutture telematiche e condizioni socio-economiche svantaggiate. Le aree che presentano minori livelli

[8] Un problema di equità sociale si pone anche sulla linea della *smart mobility* legata all'innovazione dei veicoli, nel caso delle cosiddette "zone a traffico limitato ambientale", ossia aree (in genere create nelle parti più centrali delle città, a volte estese fino a coprire l'intero territorio comunale) in cui l'accesso è consentito solo ad automobili che rispettano determinate prestazioni ambientali, in particolare rispetto alle emissioni inquinanti. Nella città di Torino attualmente non possono circolare i veicoli Euro 0 a benzina e quelli diesel Euro 0, Euro 1 ed Euro 2; nella ZTL centrale non possono circolare i veicoli con omologazione inferiore ad Euro 3. Ovviamente queste limitazioni finiscono per danneggiare in misura più significativa coloro che, per motivi economici, hanno maggiore difficoltà a sostituire le proprie autovetture più vecchie con modelli più recenti.

di accessibilità (principalmente in quanto meno servite dal trasporto pubblico: tipicamente, le aree rurali e montane o quelle più marginali nei contesti urbani) da un lato ospitano popolazione con livelli di reddito, di istruzione e di alfabetizzazione informatica minore rispetto alle aree più accessibili; dall'altro lato, sono anche caratterizzate spesso da una minore dotazione di infrastrutture digitali e telematiche, almeno nelle loro versioni più avanzate (Farrington, Farrington 2005; Velaga, Beecroft, Nelson, Corsar, Edwards 2012). Questo intreccio rischia di esasperarsi, se la mobilità viene a essere sempre più fondata sull'integrazione con le ICT.

4 *SMART MOBILITY*, POLITICHE SETTORIALI E PROCESSI DI TERRITORIALIZZAZIONE

Se le pratiche individuali e sociali svolgono dunque un ruolo fondamentale nel determinare quanto la mobilità *smart* possa essere anche più sostenibile, diventa cruciale integrare le politiche della *smart mobility* nel quadro più generale delle politiche urbane, che possono influenzare tali pratiche (come del resto già sottolineato per la *smart city* in generale: si veda, ad esempio, Morandi, Rolando, Di Vita 2013).

In primo luogo, questa integrazione deve concernere le politiche specifiche del settore dei trasporti, nel quale già in passato spesso si sono contrapposti due approcci: uno è quello che cerca, attraverso piani e politiche settoriali, di riequilibrare la ripartizione modale degli spostamenti verso i mezzi meno impattanti; il secondo è quello che oggi possiamo ricondurre alla *smart mobility*, in quanto tende invece a privilegiare l'innovazione tecnologica per fluidificare il traffico stradale e ridurne gli impatti ambientali, assumendo come troppo costosa e problematica una sua riduzione a favore di altre modalità di spostamento (Poli 2011). Questi due approcci in realtà sono complementari, per due ragioni. Da un lato, gli effetti potenzialmente positivi delle innovazioni nelle tecnologie dei trasporti possono risultare più lenti o minori di quanto stimato, a causa dei tempi e delle dinamiche di appropriazione collettiva di tali tecnologie, come si è detto nel par. 2. Ad esempio, un'analisi di scenario condotta dalla Provincia di Torino (2011) ha provato a simulare che effetti sull'inquinamento avrebbero a Torino il rinnovo del parco veicolare privato e pubblico (stimato sulla base dei tassi medi di rinnovo registrati prima della crisi del 2008) e la fluidificazione del traffico, a parità di flussi veicolari: tra il 2008 e il 2015, le concentrazioni di PM_{10} calerebbero del 6%, scendendo così da 51 a 48 microg/mc, un valore ben distante dalla soglia limite per la salute fissata a 40 microg/mc. Se agli effetti dell'innovazione tecnologica si affiancassero misure di riequilibrio modale (come potenziamento del trasporto collettivo e non motorizzato, estensione della ZTL ecc.), la riduzione delle concentrazioni di PM_{10} sarebbe più che doppia, pari al 13% (pur non ancora sufficiente a raggiungere nel 2015 la soglia obiettivo fissata dall'Unione europea, che verrebbe rispettata solo nel 2020).

Dall'altro lato, proprio da interventi e politiche dei trasporti "più tradizionali" dipende la realizzazione di alcune precondizioni per un efficace funzionamento delle stesse tecnologie *smart*. Ad esempio, Torino è all'avanguardia per la dotazione di impianti semaforici centralizzati, che adeguano in modo dinamico la durata del verde sulla base degli effettivi flussi veicolari misurati, con l'obiettivo di dare la priorità ai mezzi pubblici (Schmöcker, Bell 2010). A oggi, i semafori centralizzati nella città sono 330 (la metà circa dei 655 totali), distribuiti su alcuni dei principali assi di scorrimento fuori dal centro storico, un modo da coprire l'intero tragitto di alcune linee tramviarie. Secondo i test condotti dal consorzio 5T che li gestisce, i semafori centralizzati possono incrementare del 17-20% la velocità commerciale dei mezzi del trasporto pubblico, purché questi viaggino su corsie riservate; senonchè, a fronte di un consistente investimento per installare questa tecnologia, la Città ha trascurato quello – peraltro assai più ridotto – relativo alle corsie riservate, con il risultato che oggi i tram in città mostrano la stessa velocità commerciale di dieci anni prima (fig. 2).

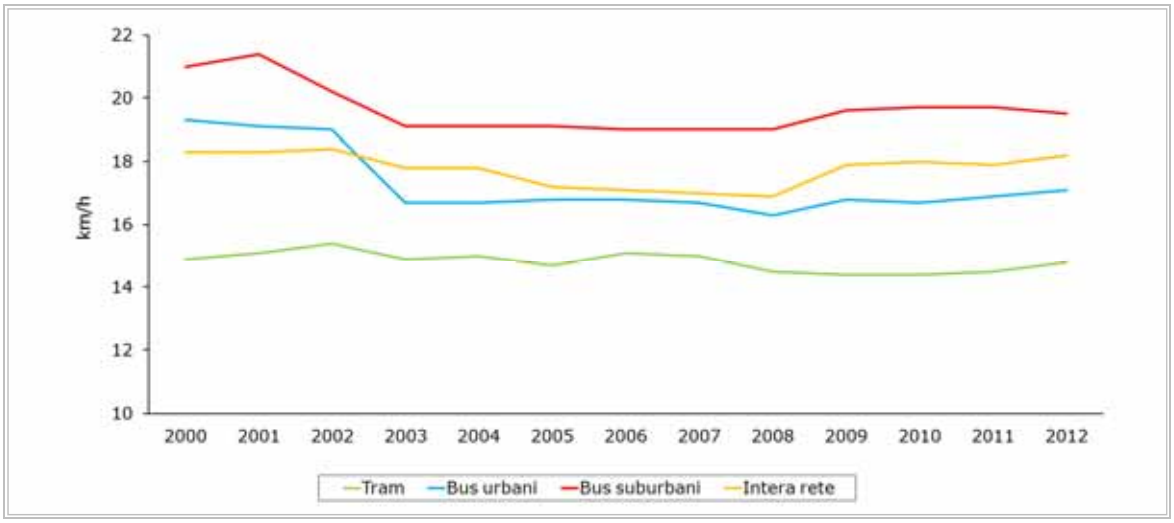

Fig. 2 – Velocità commerciale dei mezzi pubblici nell'area torinese (media della velocità commerciale, in km/h, su 12 mesi)

Ma il discorso può e dovrebbe essere allargato dall'integrazione con la pianificazione settoriale dei trasporti a quella con la più generale pianificazione territoriale. Si è messo in evidenza nel par. 2 come la costanza dei tempi giornalieri dedicati alla mobilità delle persone determini che un incremento della velocità media degli spostamenti spesso finisca per alimentare i fenomeni di diffusione urbana. Il circolo vizioso tra processi di *sprawl* e dipendenza dall'uso dell'auto è stato ormai ampiamente studiato, così come è stata posta in evidenza l'importanza di un ridisegno degli insediamenti – soprattutto a scala metropolitana – secondo modelli policentrici incentrati sui nodi del trasporto pubblico per favorire forme di mobilità più sostenibili (Banister, Marshall 2007; Boscacci, Camagni, Corda, Moretti 2001; Jenks, Dempsey 2005).

Il movimento della *smart growth*, che alcuni (Vanolo 2013) individuano come uno dei riferimenti teorici e dei precursori della *smart city*, nasceva proprio per proporre quest'alternativa ai processi di diffusione urbana dominanti negli Stati Uniti nella seconda metà del XX secolo. Oggi però, nelle politiche di *smart mobility* questo riferimento all'importanza di un'integrazione con le politiche e la pianificazione territoriale è completamente assente[9], e rischia di minarne l'efficacia, perché non influisce su uno dei determinanti fondamentali delle scelte di mobilità, ossia la localizzazione spaziale delle origini e delle destinazioni degli spostamenti: in altre parole, la fluidificazione del traffico e la riduzione dei livelli di congestione che gli ITS potrebbero garantire sul breve periodo rischiano di essere almeno in parte vanificati, sul medio e lungo periodo, proprio perché potrebbero alimentare ulteriori fenomeni di *sprawl* senza una pianificazione territoriale volta a contenerli.

Ma per evitare che le politiche di *smart mobility* accentuino i fenomeni di polarizzazione sociale e territoriale, è cruciale non solo una loro integrazione con le politiche e i piani dei trasporti e del territorio, ma una loro più generale territorializzazione.

Ciò significa, per esempio, rompere la dinamica centro/periferia connessa al mercato, promuovendo sperimentazioni e applicazioni di innovazioni *smart* del sistema della mobilità non sempre a partire dalle aree più centrali e ricche delle aree metropolitane, ma al contrario in quartieri e zone più marginali, e usare tali innovazioni come leva per una più generale riqualificazione e rigenerazione dell'area. Un approccio di questo tipo è stato usato, per certi versi, nei Contratti di quartiere (promossi dal Ministero dei Lavori Pubblici in Italia nel 1997), in cui la riqualificazione energetica degli edifici è stata uno dei punti di partenza per attivare

[9] Anche perché le politiche per la *smart city* si fermano generalmente alla scala urbana (se non di quartiere) senza prendere in considerazione i territori circostanti, che invece hanno un'importanza cruciale nel determinare i pattern complessivi di mobilità, soprattutto in ambiti metropolitani.

un processo di rigenerazione locale. Le innovazioni di *smart mobility* richiedono spesso un qualche intervento di modifica dello spazio stradale, per dotare l'infrastruttura di sensori o strumenti in grado di interagire con le *app* messe a disposizione degli utenti che si muovono nell'area; questi interventi potrebbero essere strutturati in termini non puramente tecnologici, bensì nell'ottica di un ridisegno di strade e piazze volto a migliorarne qualità e vivibilità, che spesso nelle aree più marginali sono ridotte.

Si pensi all'auto elettrica, uno dei mantra nei discorsi sulla *smart mobility*. Le stime sulle possibilità di una sua diffusione di massa sono alquanto variabili; molto dipenderà da quanto rapidamente verranno superati alcuni limiti delle tecnologie attualmente disponibili (Deloitte 2010). Ad ogni modo, la riflessione sulle implicazioni per la *smart city* dell'affermarsi di questo tipo di mezzo si è per ora quasi esclusivamente limitata alla necessità di un'integrazione con le *smart grid*, indispensabile per garantire che i vantaggi dell'auto elettrica (in termini, in particolare, di inquinamento atmosferico e acustico) siano effettivi, grazie all'uso di energia ricavata da fonti rinnovabili, e non solo derivanti da una delocalizzazione del problema (nel caso l'energia elettrica utilizzata venisse prodotta da centrali termoelettriche che utilizzano combustibili fossili, magari situate a centinaia o migliaia di chilometri di distanza). In realtà, l'auto elettrica ha una differenza fondamentale rispetto a quella tradizionale: deve essere ricaricata durante la sosta.

Che cosa comporta questa differenza per la progettazione dello spazio pubblico? È scontato che debba riprodursi la situazione attuale, con la sosta delle automobili prevalentemente distribuita lungo i marciapiedi, dotati di apposite colonnine per la ricarica? Quali sarebbero gli effetti sulla qualità estetica del paesaggio urbano? E quali forme di conflittualità sociale potrebbero nascere, nel momento in cui la sosta non fosse solo una questione di spazi (dove lasciare l'auto), ma anche di tempi (necessari per garantire la ricarica, indispensabile poi per potere usare il mezzo stesso?).

O potrebbe essere questa l'occasione per ripensare l'occupazione del suolo pubblico legata alla sosta e il rapporto abitazione/auto, secondo modelli già sperimentati in innovativi quartieri *car-free* del Nord Europa: la sosta viene concentrata in appositi parcheggi in struttura, dotati delle infrastrutture per la ricarica e localizzati ai margini delle aree residenziali, con la necessità di percorrere maggiori distanze per accedere alla propria auto da casa (o dal posto di lavoro, dai servizi, ecc.) ma al tempo stesso con l'opportunità di liberare spazio lungo la strada per la mobilità pedonale, per il verde, per gli arredi urbani ecc.? Ed è possibile che sperimentazioni di questo tipo vengano avviate proprio a partire dalle aree più marginali e degradate, dove più è necessario una riqualificazione degli spazi pubblici?

Da un punto di vista socio-economico, poi, la territorializzazione delle politiche di *smart mobility* in aree connotate da situazioni di marginalità diffuse potrebbe significare l'affiancamento delle sperimentazioni con percorsi, da un lato, di una più generale alfabetizzazione informatica dei residenti più deboli, che parta proprio dall'uso dei dispositivi sperimentati; dall'altro lato, di sensibilizzazione culturale rispetto agli impatti ambientali della mobilità: e proprio la possibilità di mostrare, tramite una diffusa dotazione di sensori, come diversi pattern di mobilità in queste aree influiscano sulla qualità dell'aria che viene respirata direttamente da chi ci vive e vi si muove, potrebbero potenziare significativamente l'efficacia delle azioni di educazione per una mobilità più sostenibile.

Ancora, un approccio per aree e distretti può favorire e avviare lo sviluppo di applicazioni innovative sulla mobilità – e non solo – a partire dalle nuove informazioni e infrastrutture messe a disposizione nel progetto[10], costituendo anche occasione di sviluppo locale.

[10] In molti casi – come nella già citata Tallinn a proposito dell'*ID ticketing*, o a Helsinki, dove è stata elaborata una piattaforma complessiva per la gestione della mobilità e delle relative informazioni ai cittadini – sperimentazioni locali sulla *smart mobility* hanno portato alla formazione di spin off che poi hanno commercializzato a livello nazionale o internazionale le tecnologie create.

5 CONCLUSIONI

La *smart mobility* sembra presentare varie potenzialità nel perseguimento di una maggiore sostenibilità dei sistemi di trasporto, in termini economici (ad esempio, fluidificazione del traffico e dei livelli di congestione), sociali (maggiore equità nella distribuzione dei costi e dei benefici degli spostamenti), ambientali (riduzione dei consumi e delle emissioni). Al tempo stesso, l'attualizzazione di queste potenzialità, e l'entità degli impatti positivi che esse determineranno, dipenderà da come le tecnologie, su cui la *smart mobility* è incentrata, verranno incorporate dagli utenti nelle proprie pratiche ed attività quotidiane. In questo articolo si è provato ad argomentare perché non si possa dare per scontato che queste tecnologie, e in particolare la maggiore quantità e qualità delle informazioni che esse garantiranno, si traducano automaticamente in comportamenti di mobilità più sostenibili. Diventa quindi cruciale che al centro delle politiche di *smart mobility* siano posti i cittadini con i loro comportamenti; e che tali politiche siano affiancate ed integrate da altre politiche e strategie (trasportistiche, socio-educative, territoriali ecc.), volte ad indirizzare questi comportamenti verso le traiettorie desiderate.

Concludendo, si vuole ancora sottolineare un aspetto, finora poco affrontato nei discorsi sulla *smart mobility*, relativo alla possibilità che, a seguito della crisi strutturale che il contesto europeo sta attraversando, si vadano ad affermare stabilmente scenari di post-crescita, i quali potrebbero richiedere un ripensamento delle strategie di *smart mobility*.

Il forte rallentamento delle vendite di automobili in questi ultimi 4 anni sta frenando consistentemente il rinnovo del parco veicolare; l'uso dell'automobile potrebbe effettivamente proseguire quella contrazione che si è iniziata a registrare a seguito della crisi, e le ICT potrebbero trovare un'applicazione più fertile e richiesta su altre modalità di spostamento (Audimob 2012).

Il trasporto collettivo urbano è stato finora oggetto di sperimentazioni relative soprattutto al miglioramento della gestione della flotta dei mezzi e alle informazioni per gli utenti, poco o nulla rispetto alle applicazioni che potrebbero essere utilizzate dagli utenti a bordo dei mezzi o alle fermate. Tali innovazioni, soprattutto se pensate per quegli utenti (in primis gli anziani) che più sono vittime del *digital divide*, potrebbero diventare un fattore competitivo per il trasporto pubblico nel riequilibrio modale, e al tempo stesso opportunità di business per le aziende che le sviluppano, sperimentano e applicano con successo a livello locale e hanno poi la possibilità di commercializzarle[11]. Al tempo stesso, proprio il trasporto pubblico è oggetto in questi ultimi anni di forti tagli a causa della contrazione dei finanziamenti statali e regionali, e la sua competitività tende a declinare fortemente al di sotto di una certa soglia di servizio.

Potrebbe dunque concretizzarsi, almeno alla scala locale, un "ritorno" a forme di mobilità imperniate maggiormente sugli spostamenti pedonali e ciclabili: del resto, nell'Unione europea (così come in Italia), il 30% degli spostamenti copre distanze inferiori ai 3 chilometri, il 50% ai 5 chilometri, percorrenze su cui la bicicletta è spesso più competitiva dell'automobile. In questo ambito, la *smart mobility* si è finora incentrata soprattutto sul *bike sharing*[12], mente lo sviluppo di applicazioni per la mobilità pedonale è stata assai limitata: le prospettive sembrano legate soprattutto alla creazione di mappe interattive visualizzabili su

[11] In quest'ottica, Torino potrebbe ripensare il suo ruolo da "città dell'auto" a "città della *smart mobility*", grazie alle competenze localmente presenti sia nel settore dei mezzi di trasporto (e non solo delle autovetture) sia in quello delle ICT; la prevista privatizzazione di una parte dell'azienda locale del trasporto pubblico, GTT, potrebbe essere l'occasione per coinvolgere partner privati in sperimentazioni che vadano in questa direzione.

[12] I servizi di condivisione di automobili e biciclette, resi possibili grazie a sistemi di gestione incentrati sulle ICT, sono uno degli elementi ricorrenti nelle strategie di *smart mobility*. Torino è una delle città italiane più all'avanguardia sia nel *bike sharing* che nel *car sharing*, tanto come dotazione di mezzi che come numero di utenti. Soprattutto il *car sharing* potrebbe conoscere, in uno scenario di post-crescita, una maggiore diffusione rispetto alla situazione attuale: a Torino, per ora, gli abbonati sono lo 0,3% della popolazione, e i chilometri percorsi dalle auto del servizio sono circa lo 0,1% della distanza complessivamente coperta in città dalla mobilità motorizzata. Anche in Svizzera, il paese europeo dove il *car sharing* ha raggiunto la massima diffusione, a 20 anni dalla sua attivazione gli utenti superano di poco l'1% della popolazione (Loose 2011).

smartphone, che portino chi cammina a scegliere i percorsi anche in funzione della presenza di conoscenti nei dintorni (individuabili a partire dai GPS), di informazioni inviate dalle attività commerciali della zona ecc.; in altre parole, innovazioni fortemente integrate con la dimensione urbana locale (Hodgson 2012).

In sintesi, se davvero dovesse affermarsi uno scenario di post-crescita, la *smart mobility* potrebbe assumere evoluzioni e sviluppi alquanto diversi da quelli attualmente previsti e inseguiti dal mercato; in particolare, l'effettiva efficacia ed efficienza dei sistemi di mobilità potrebbe risultare meno dipendente dall'innovatività delle tecnologie che li caratterizzano, mentre acquisirebbe ancora più centralità l'integrazione di queste ultime con la pianificazione territoriale e della mobilità.

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EU SMART CITY GOVERNANCE

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ABSTRACT

In recent years European Commission has developed a set of documents for Members States tracing, directly or indirectly, recommendations for the transformation of the European city.
The paper wants to outline which future EU draws for the city, a future often suggested as Smart City. This aim is achieved through an integrated and contextual reading of addresses and strategies contained in the last documents elaborated by European Commission.
Although the three main documents (Cohesion Policy 2014-2020 of European Community, Digital Agenda for Europe and European Urban Agenda) face the issue of the future development of European cities from different points of view, which are respectively social cohesion, ICT and urban dimension, each of them pays particular attention to urban and territorial dimension, identified by the name of Smart City.
In other words, the paper aims at drawing the evolution scenario of Smart Cities that can be delineated through the contextual reading of the three documents. To this end, the paper is divided into three parts: the first part briefly describes the general contents of the three European economic planning tools; the second part illustrates the scenarios for the future of the European city contained in each document; the third part seeks to trace the evolution of the Smart City issue developed by the set of the three instruments, in order to provide the framework of European Community for the near future of our cities.

KEYWORDS:
Smart Cities, urban development, cohesion policy, Digital Agenda, Urban Agenda, ICT

1 THE EU 2020 FRAMEWORK FOR ACTION

This section describes the main contents of three strategic documents for urban and territorial development as they deal with issues of extreme importance for the future of the European cities: the legislative proposals for EU Cohesion Policy 2014-2020 which promotes integrated urban policies and defines the financial and operational tools necessary for their implementation; the Digital Agenda (2010) which looks at urban and regional development in terms of digital infrastructurization of the territory with the aim to exploit the economic and social potential of ICT; the Urban Agenda (2011), which provides the recommendations for strengthening the role of cities and relocating the urban question at the center of the European Union development strategies. It is worth noting that although the European Commission has in recent years developed several documents that deal with the theme of Member States future growth, for instance the program for research and innovation Horizon 2020, the paper describes the ones that pay particular attention to urban and regional planning.

Before proceeding with the description of the document contents is considered appropriate to classify them within the broader framework of action that the European Union intends to implement by 2020. The European policy framework for the next decade is defined by the strategy launched in March 2010 "Europe 2020, a strategy for smart, sustainable and inclusive growth[1]": its five major objectives identify the goals that EU intends to achieve in 2020 and the seven Flagship Initiatives[2] represent the path that the Commission, together with Member States, will follow to implement them. The development of this strategy is closely linked to the financial planning of EU as the Flagship Initiatives not have their own budget, and their realization depends on effective coordination and management of different financial resources both at European and local level (EP, 2012). In this context on June 29th 2011, the European Commission adopted a proposal for the new multiannual financial framework 2014-2020: "A budget for delivering the Europe 2020 Strategy" in which the Cohesion Policy plays a pivotal role as it provides both operational and financial tools needed to implement the initiatives promoted by Europe 2020. The Cohesion Policy, as defined in the Treaty on the Functioning of the European Union (2008), has as its objective the strengthening of its economic, social and territorial cohesion in order to reduce the disparities between the levels of development of the various regions and to promote equal opportunities among citizens. To achieve this objective, the Cohesion Policy provides specific financial tools, the so-called Structural Funds:

- the European Regional Development Fund (ERDF), which supports the regional and local development through co-financing of investments in areas such as research, development and innovation, ICT, energy, transport infrastructure and sustainable urban development;
- the European Social Fund (ESF) aimed at promoting the employment, education and training, social inclusion, as well as improving the efficiency of public administration;
- the Cohesion Fund (CF), which supports projects in the energy sector, relating to energy efficiency and the use of renewable energy; it is addressed to the Member States whose per capita GDP is less than 90% of the EU average;
- the Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF) respectively for the development of the agriculture and fisheries sector.

[1] COM(2010) 2020

[2] Innovation Union; Youth on the move; Digital Agenda; Resource Efficient Europe; An industrial policy for the globalisation era; An agenda for new skills and jobs; European platform against poverty

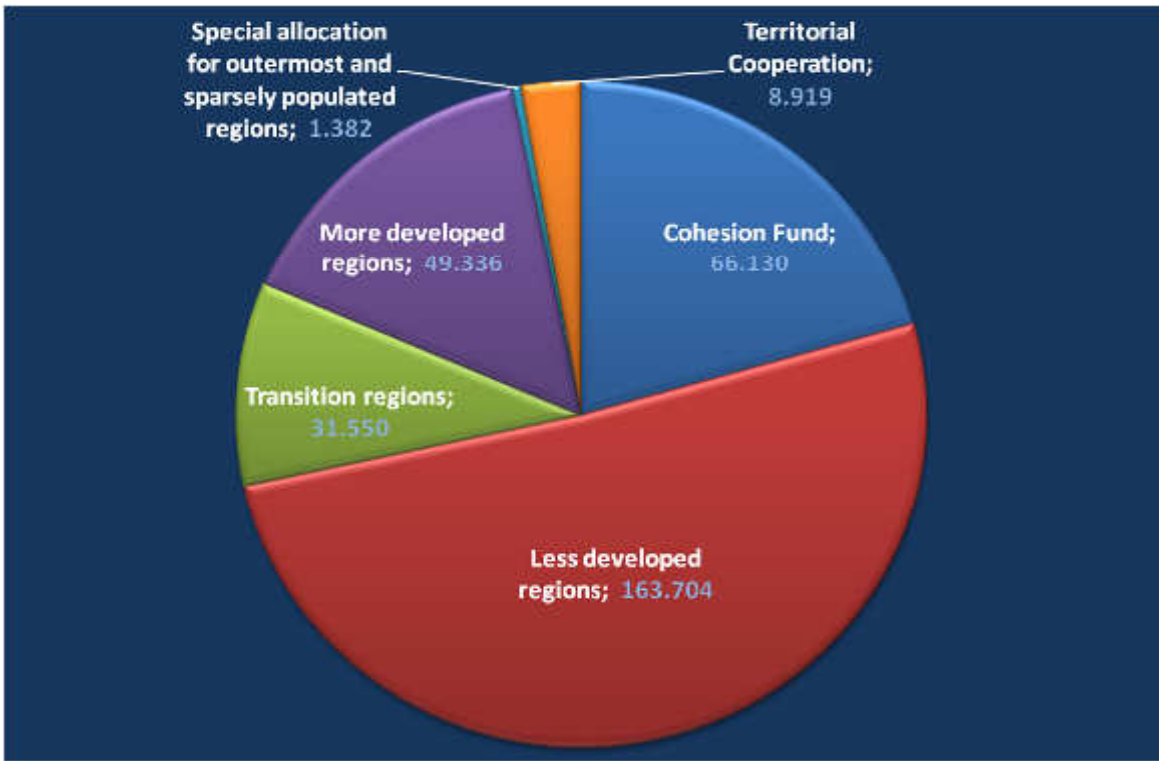

Fig. 1 - Total allocations of Cohesion Policy 2014-2020 (million €, 2011 prices), amounts subject to final adoption of MFF and sectoral legislations

The legislative proposals for the social, economic and territorial cohesion policy[3] consists of: a regulation setting out common rules for the Structural Funds[4] and three specific regulations for the ERDF, the ESF and the CF[5]. The Structural Funds are grouped together into a "Common Strategic Framework" (CSF) in order "to maximise the contribution of the CSF Funds and to provide clear strategic direction to the programming process at the level of Member States and the regions" (EC, 2012a). At the same time, the CSF is set up to facilitate sectoral and territorial coordination of Union intervention under the CSF Funds and with other relevant Union policies and instruments.

The directions for use the CSF Funds at the national level will be established by each Member State within the so called "Partnership Contracts" to be concluded with the EC for the period between 1st January 2014 and 31th December 2020. The Regional Operational Programmes of the single funds will be implemented at the regional level on the basis of the Partnership Contracts. It is worth focusing on the terms used to characterize the three operational tools proposed as they represent the key concepts of the new Cohesion Policy. The Common Framework is defined as "strategic" because it provides a strategic direction to the funds programming process in order to facilitate the sectoral and territorial coordination of EU interventions.

At the national level is emphasized the concept of "partnership" between the different parties involved at various levels of planning (regional and local authorities, economic and social actors, non-governmental organizations, etc.). In the overall framework of Cohesion Policy, the partnership process is considered to be a priority so that in order to support its development the EC provides for a European Code of Conduct on Partnership (ECCP) which will lay down a framework within which the Member States shall pursue implementation of the partnership principle (EC, 2013a). Finally the "operational" tools are delegated to

[3] COM(2011)615; COM(2012)496; SWD(2012) 61
[4] COM(2012)496
[5] COM(2011) 614; COM(2011) 607; COM(2011) 612

regional and local authorities in order to ensure the necessary flexibility to meet their local needs and to give sufficient attention to local specificities. This approach strengthens the local level compared to the previous programming cycles and it aims at greater synergy and coherence of individual POR within the national strategy.

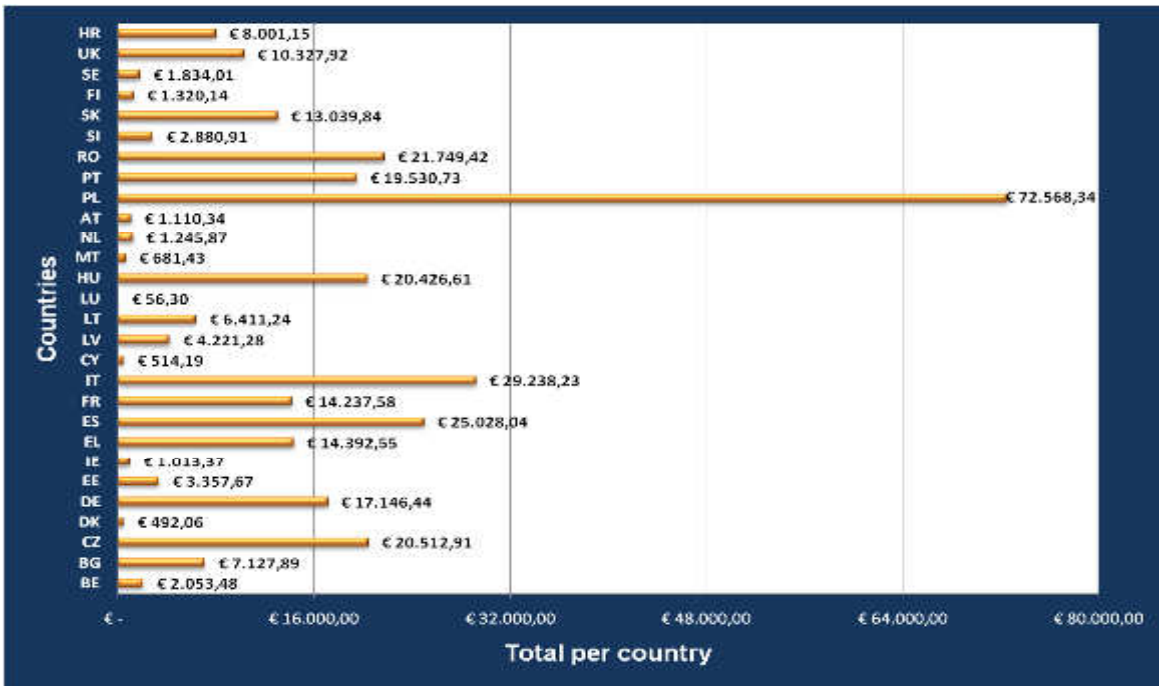

Fig. 2 –Total allocations of Cohesion Policy 2014-2020 (million €, 2011 prices) for each Member State referred to July 2013

The main innovations introduced by the Cohesion Policy 2014-2020 are the focus on results, a greater use of conditionality and the coordination among CSF Funds and with other relevant Union policies and instruments (EC, 2012a). With regard to the first point, the new EU Cohesion Policy assigns a primary role to the process of monitoring and verifying the results; for this reason the Commission plans to concentrate the new programs on a limited number of priorities and to define a set of indicators to assess the progress made towards the achievement of the programs objectives. In addition, in order to focus more on results the proposed programs and instruments introduce the principle of conditionality that will take the form of both so-called ex ante conditions that must be in place before funds are disbursed, and so-called ex post conditions that bind the provision of additional funds to the achievement of pre-established results. The lack of progress will also rise to the suspension or cancellation of funding. The European Commission plans to assign the 5% of the cohesion budget to the most virtuous Member States and regions, during the mid-term performance review planned in 2017 and 2019.

The Commission's proposals have, therefore, adopted the principle defined by the Barca Report (Barca, 2009) according to which "the multi-sectoral nature of place-based development policy requires horizontal coordination and reciprocal commitment at every level of government. Contracts, both vertical and horizontal, and conditionalities for the granting of funds are a defining feature of multilevel governance".

A "policy of conditional transfers" is then re-launched according to which the transfer of resources shall be subject to ex ante conditions in order to ensure that the provided funds have the conditions to exert maximum benefit, and at the same time, it depends also on the achievement of certain objectives (ex-post conditions) (Regione Molise, 2013). The importance assigned to the coordination of Cohesion Policy with other Union policies and instruments came from the need to address two issues that the EC has had to deal

with in the planning of economic resources for 2014 -2020: on the one hand, the reduction of the available funds compared to previous cycles (340 Million Euros[6], about 8,3% less than in the period 2007-2013) and, on the other, the economic crisis that limits the possibilities of co-financing of the Member States. As a matter of fact, "the lack of synergies between different policy instruments related to overlapping thematic fields was one of the main reasons of the Lisbon Strategy failure" (EP, 2010). To this end there are new coordination mechanisms that provide for the involvement of the managing authorities responsible for other CSF Funds to avoid overlap, the establishment of e-governance, as well as identifying areas of intervention in which the Funds may be combined in a complementary manner. To maximize the contribution of the CSF Funds for a smart, sustainable and inclusive growth, the Cohesion Policy also provides that Member States identify how their programs can contribute to achieve the Europe 2020 and the Flagship Initiatives objectives, thereby avoiding the duplication of efforts and taking full advantage of the possibilities of combining different instruments to support individual projects.

Europe 2020	Thematic objectives of the CSF	Structural Funds	Reference to other relevant Union policies and programs
Smart growth: developing an economy based on knowledge and innovation	1) Strengthening research, technological development and innovation	ERDF and EAFRD	Horizon 2020 Smart Specialization Platform Joint Programming Initiatives ESFRI Innovation Union Flagship Initiative
	2) Enhancing access to, and use and quality of information and communication technologies		Horizon 2020 Connection Europe Facility Digital Agenda for Europe
	3) Enhancing the competitiveness of SMA and of the agricultural and fisheries and aquaculture sector		Small Business ACT EU Project for SMA
Sustainable growth: promoting a more resource efficient, greener and more competitive economy	4) Supporting the shift towards a low-carbon economy in all sectors		Energy saving Directives Strategic Energy Technology Plan Energy Roadmap 2050 European Emission Trading Scheme, NER 300 Programme, LIFE
	5) Promoting climate change adaptation, risk prevention and management		Climate change White Paper LIFE
	6) Protecting the environment and promoting resource efficiency		Water, Waste and Air Quality Directives LIFE Nature 2000 Resource Efficient Europe FI Creative Europe
	7) Promoting sustainable transport and removing bottlenecks in key network infrastructures	ERDF	Connection Europe Facility Horizon 2020 Resource Efficient Europe Transport White Paper 2011
Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion	8) Promoting employment a nd supporting labour mobility	ERDF, EAFRD, ESF	Employment Guideline 7 2020 Program for Social Change and Innovation Erasmus for all
	9) Promoting social inclusion and combating poverty		Program for Social Change and Innovation Erasmus for all Asylum and Migration Fund
	10) Investing in education, skills and lifelong learning		Erasmus for all
	11) Enhancing institutional capacity and an efficient pubic administration		

Fig. 3 –The UE CSF Funds 2014-2020: thematic objectives grouped on the basis both of Europe 2020 priorities and relationship with European Funds and policies.

To provide guidelines on how to coordinate Cohesion Policy with the Flagship Initiatives, the European Parliament has prepared a study entitled "How to integrate the EU flagship initiatives into Cohesion Policy" which shows that although the proposals of Cohesion Policy are oriented towards the coordination among the CSF Funds and the Europe 2020 objectives, "flagship initiatives are currently only sporadically integrated into the legislative proposals for the 2014-20 Cohesion Policy Framework" (EP, 2012).

[6] Expressed in constant 2011 prices.

In the draft of the CSF, the Digital Agenda[7] is one of the four Flagship Initiatives explicitly mentioned in the thematic objective 2 "Enhancing access to, and use and quality of information and communication technologies". This objective is directly attributable to the thematic priorities of the Digital Agenda:

- encouraging investments in the development of infrastructure networks;
- developing digital contents and services to improve the quality of life of citizens and businesses through easy access to online learning (e-Learning), teaching (e-Education), administration (e-Government) and health (e-health).

Digital Agenda identified 101 specific policy actions structured in 7 domains: the digital single market, interoperability and standards, trust and security, fast and ultra-fast internet access, research and innovation, digital literacy, skills and inclusion and ICT-enabled benefits for EU society. To effectively implement the 101 actions, the European Commission plans to fund them with the resources allocated in the budget proposal for the Multiannual Financial Framework (MFF) for the period 2014-2020 (COM (2012) 784). The economic resources to draw upon are related to four types of the CSF Funds: ERDF, ESF and EAFRD.

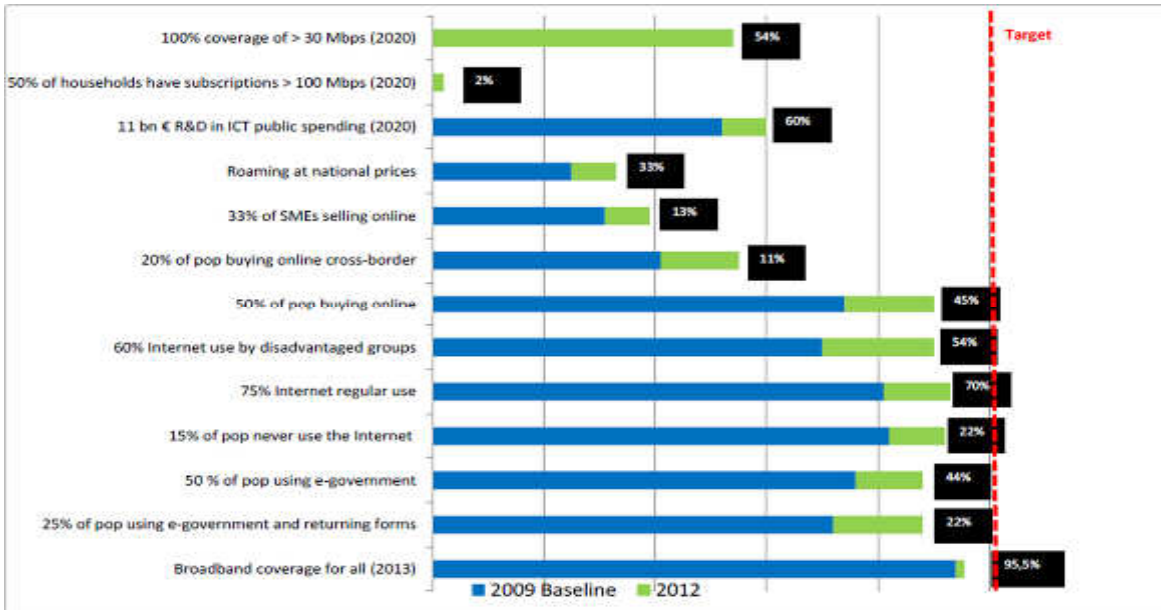

Fig. 4 – How the EU scores on the Digital Agenda targets

The help of the ERDF is primarily oriented to support the development of next generation access networks (NGA), e-Government and ICT applications that can help to overcome some of the biggest challenges for the next decade as the reduction of carbon emissions and the energy efficiency improvement. ESF provides instead financial support to promote the use of ICT and to contribute actively to the development of digital literacy. Investments in ICT within the EAFRD are geared mainly to improve the accessibility, utilization and quality of ICT in rural areas through the extension of broadband infrastructure and the promotion of digital skills among farmers, the managers of forests and rural companies. Progress on implementing the Digital Agenda is measured in the annual Digital Agenda Scoreboard. The last Scoreboard, assessing overall impact on the basis of the key performance targets, has been published in June 2013, reporting on the progress of those actions between June 2012 and May 2013 (Pinto, Mazzeo, 2013). As can be seen in Figure 4 almost all targets are about to be achieved. During the past three years, the use of the network has increased steadily, especially among the most disadvantaged groups and the coverage of broadband network is almost

[7] COM(2010) 245, COM(2012) 784

complete. Network users use increasingly internet to make their purchases online, but also to take advantage of eGovernment services. Currently, CE has completed 61 of the 101 actions, while eight have been erased and the remaining 32 are nearing completion. To align the technological and innovation possibilities with a better and more inclusive governance, the European Parliament proposes the definition of a European Urban Agenda[8] giving the city a major role in the design and implementation of the future European Cohesion Policy. The proposal submitted by the resolution of 23rd June 2011, points out that "local elected authorities have direct political accountability in terms of strategic decision-making and investing public resources" and that "in order to reach the goals of the Cohesion Policy and EU 2020 Strategy there must be obligatory involvement of local elected bodies in the strategic decision-making process, close involvement in drawing up operational programmes and broad use of the option of subdelegated responsibilities in the implementation and evaluation of the Cohesion Policy" (EP, 2011). Urban Agenda is in fact the "urban dimension" of European Cohesion Policy, that represents the tool through which European Union intends to coordinate urban policies of the Member States by focusing on a bottom-up approach, which, according to some authors, better reflects the orientation of the Smart Cities of the future (Siegle 2012). In other words, through the Urban Agenda, European Parliament defines the path to follow, in order to achieve a multi-level bottom-up governance that supports the development of innovative technological infrastructure contained within the European Digital Agenda. This proposal invokes the thought of some scholars about smart cities: "the essence of future smart city is based on the idea of coordinating and integrating technologies that have been still developed separately from each other but have clear synergies in their operation and need to be coupled with a bottom-up approach" (Papa, Gargiulo, Galderisi, 2013).

European Parliament proposes to concentrate on three objectives for the development of the urban dimension: firstly supporting urban areas to develop their basic physical infrastructure as a prerequisite for growth, by focusing both on the economic diversification and energy and environmental sustainability; secondly helping urban areas to modernize their economic, social and environmental characteristics, through smart investments in infrastructure and services based on technological progress closely related to national, regional and local needs; thirdly redeveloping urban areas by recovering industrial sites and contaminated lands. The achievement of these goals during the next planning cycle 2014-2020 assumes that the different administrative authorities involved, cooperate in order to:

- develop a multi-level governance aiming at a greater involvement of regional and local authorities and of society in the design, implementation, communication and evaluation of urban development strategies;
- promote the training of urban and local authorities that provide information on the programs and initiatives of urban policy;
- resort to a "smart urban development" by exploiting the great potential of modernization of infrastructural investments through intelligent technologies;
- steer the planning process towards an "integrated strategic" dimension, in order to facilitate local authorities in the transition from an approach in terms of individual projects in an intersectoral one; for this purpose European Parliament "calls on Commission to make legally binding integrated urban planning when projects are co-financed with EU funds";
- initiate new partnerships between the public and private sectors and innovative strategies for urban infrastructural development in order to attract investment and stimulate the economy.

[8] 2010/2158 (INI)

2 THE SMART CITY IN THE EUROPEAN UNION DOCUMENTS

This section discusses the scenarios for the future of the European city proposed by each document, with the aim of identifying specific references to issues of urban development and the Smart City. Although in most cases there is not any explicit reference to the term "smart city", the forecasts of city development contained both in the guidelines and recommendations of the European documents are clearly related to those aspects that many authors identify as characterizing factors of the Smart City. Digital Agenda objectives, aimed at improving the quality of life of citizens and businesses through the development of the economic and social potential of ICT, are connected to the vision of Smart City proposed by Batty: "a city in which ICT is merged with traditional infrastructures, coordinated and integrated using new digital technologies" (Batty, 2012). Urban Agenda approach for the coordination of urban policies of the Member States aims at the integration across all levels of governance, as well as the mentioned bottom-up approach proposed by Siegle. In this regard, Nam and Pardo also stated that "coordination of policies across all levels of governance is of vital importance to innovation in a city" (Nam and Pardo, 2011).

A direct reference to territorial issues is made by the Cohesion Policy that, for the first time, in 2009, introduced the territorial dimension in its denomination, as a necessary completion to the objectives of economic and social cohesion. This decision demonstrates the EC willingness to focus on cities and urban areas that effectively come under European Union competence, thanks to both the Treaty on the Functioning of the EU (2008) and the Treaty of Lisbon (2009). The proposals contained in the package of regulations of the Cohesion Policy 2014-2020 related to the field of urban development are mainly oriented to promote integrated policies for sustainable development: "the multiple dimensions - environmental, economic, social and cultural - of urban life are intertwined, therefore a positive urban development can only be achieved through an integrated approach" (EC, 2011).

The main suggestions made to this end mainly concern the adoption of integrated investment strategies oriented to a more strategic and holistic approach: "Such an approach is especially important at this time, given the seriousness of the challenges European cities currently face, such as specific demographic changes, the consequences of economic stagnation in terms of job creations and social progress, and the impact of climate change" (EC, 2011).

Among the five funds within the Common Strategic Framework, the ERDF is aimed at supporting sustainable urban development at regional and local levels. From reading the investment priorities of the ERDF, the main features of the future European city the can be drawn as: a city characterized by a high quality and affordability to innovative communication technologies, based on a low-carbon economy in all sectors, promoting investments specifically related to the adaptation to climate change and the smart and sustainable urban transport, investing in research and innovation and promoting the employment and social inclusion. The tools that the EC introduces to strengthen the territorial dimension of Cohesion Policy are the following:

- Integrated Territorial Investments (ITI) represent a simplified financing, through which EU allocates 5% of ERDF resources for integrated actions for sustainable urban development. It is a new delivery mode to bundle funding that allows to "draw on funding from several priority axes of one or more operational programs" (EC, 2011). Indeed, ITI can associate together different funding linked to strategic objectives, in order to facilitate the implementation of an integrated strategy for sustainable development in a specific territory;
- an Urban Development Platform, comprising 300 cities based on a list prepared by Member States in their Partnership Contracts to promote both the creation of networks between cities and the exchange of territorial good governance practices within the EU;

– innovative urban actions subject to a ceiling of 0,2% of the total ERDF allocation. The innovative urban actions shall be urban pilot projects, demonstration projects and related studies of European interest.

Cohesion Policy also provides a different allocation of funds in relation to GDP per capita, through the identification of three types of regions, in order to allow a balanced development between different European regions: more developed regions whose GDP per capita is higher than 90% of EU average; transition regions, with GDP per capita is between 75% and 90% of EU average, less developed regions whose GDP per capita is below 75% of EU average.

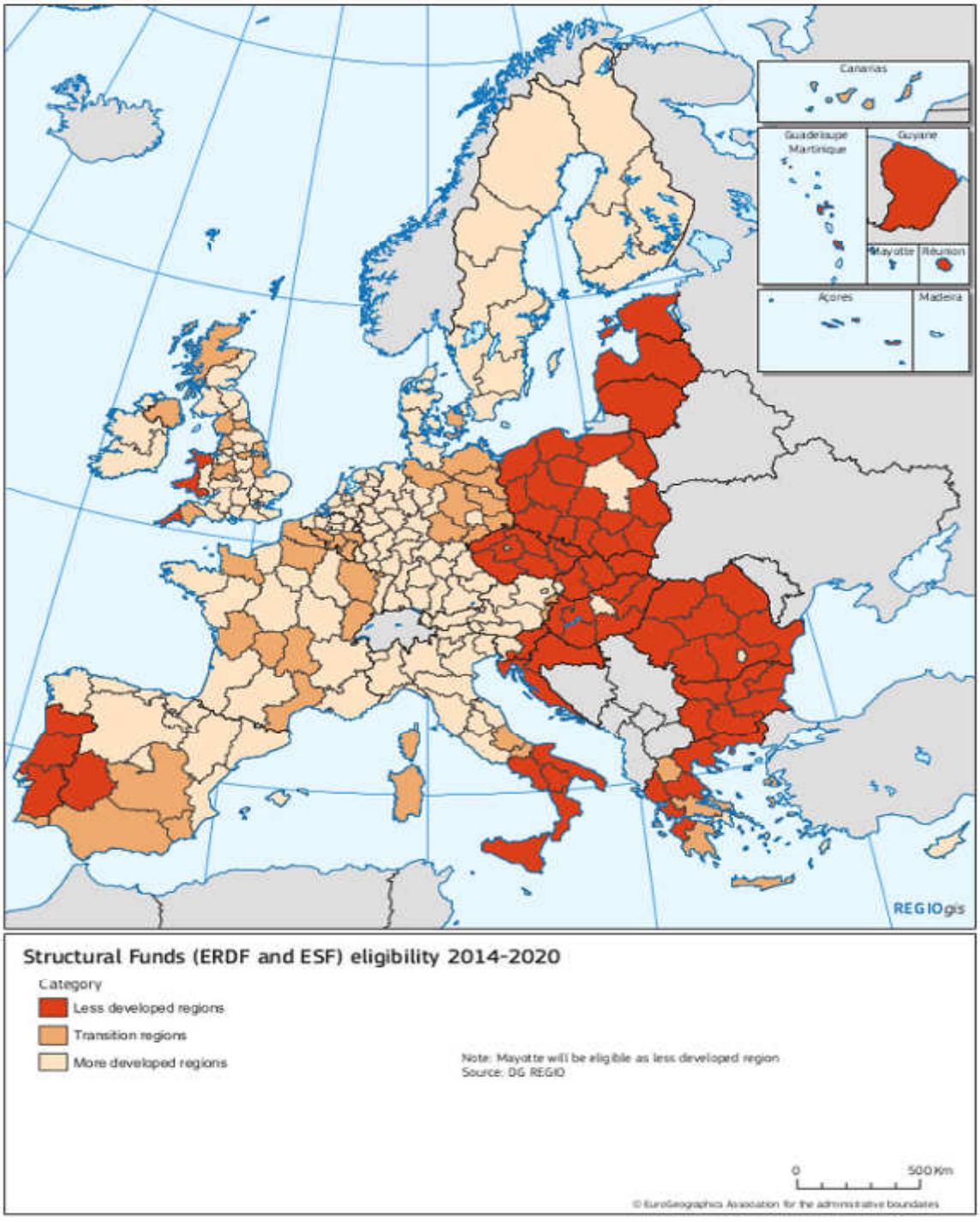

Fig. 5 – Classification of Member States in more developed regions, transition regions and Less developed regions

For each type of region Cohesion Policy allocates different rates of funding depending on the sectors where these regions should focus mainly: research and innovation (R&I) and competitiveness of small and medium-sized enterprises (60%) represent the main investment sectors for the more developed regions and transition region, while only 20% has been allocated for energy efficiency and renewable energy. These rates increase to 44% and 6% respectively for less developed regions.

The condition ex-ante for the investment support in research and innovation (R&I) and in information and communication technologies (ICT) is represented by the smart specialization. This concept has received more and more attention by EU policy for growth and economic development; in fact, in 2005 some documents drawn up for the development of the Lisbon Strategy, referred to the smart specialization as an element to enhance the competitiveness of regions (D. Foray, David PA, Hall B., 2009). The objective of smart specialization is the sustainable economic growth of the regions through a more efficient use of structural funds, by joining efforts in the field of innovation support, and increasing synergy between EU policies and national and regional ones.

The application of smart specialization is aimed at defining regional strategies for the enhancement of those sectors in which the single territories are able to excel. Regions and Member States must draw up a document oriented to: outline the strategy for smart specialization, identify the specializations that are more consistent with their own resources and capabilities and define public and private investment expected, especially related to research and innovation technology. In order to delineate their strategies, policy-makers can refer to the European platform supporting research and innovation, the Smart Specialisation Platform (S3Platform), which promotes collaboration among different administrative authorities and EU researchers and collaborates with international agencies such as the OECD and the World Bank. The main goal of this tool is to fill the innovation gap between Europe regions: according to the EU Regional Innovation Scoreboard, just one in ten invests 3% of its GDP in R&I and the percentage of innovative SMEs differs greatly from country to country.

The future of European cities outlined in the Digital Agenda is instead a future based on the development of economic and social potential of ICT. Goals contained in the Digital Agenda are geared to stimulate innovation and economic growth and improve citizen and company quality of life through a better health care, safer and more efficient transport, a cleaner environment, new communication opportunities and easier access to public services and cultural content. According to EC "the development of high-speed networks today has the same revolutionary impact that the development of electricity networks and transport had a century ago" (EC, 2010).

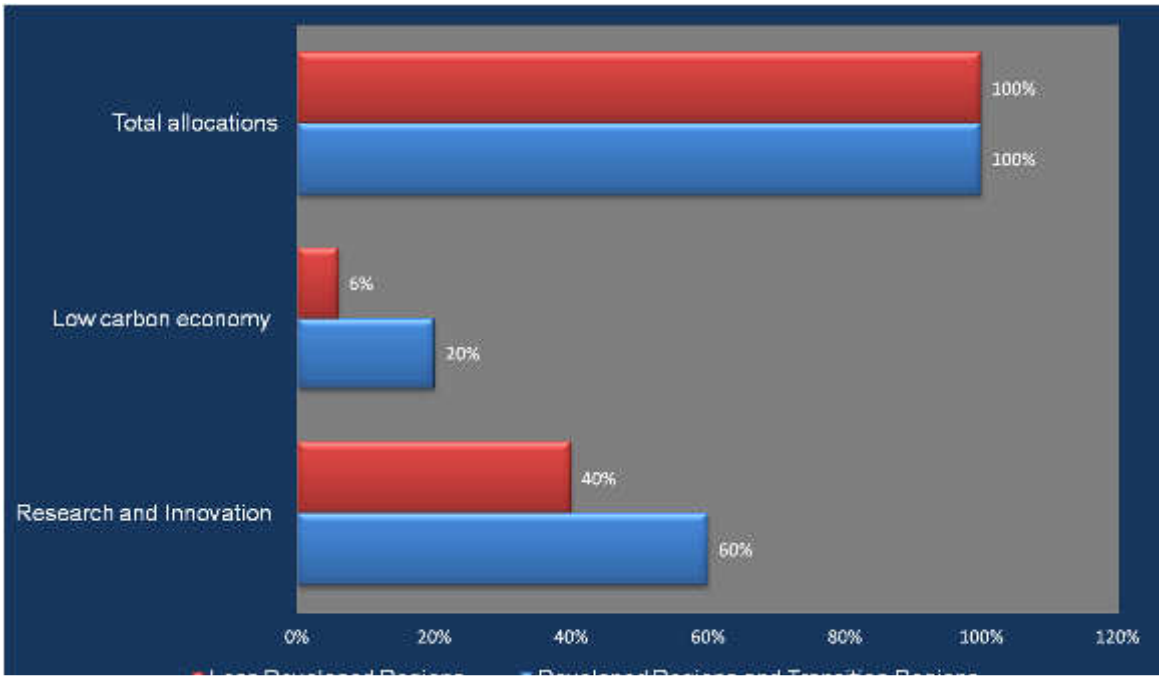

Fig. 6 – Concentration of ERDF proposed for 2014-2020

European cities to be more competitive in the near future should to be characterized by:

- e-government services, (administrative procedures, electronic public procurement, public health, etc.) available to all European citizens to reduce cost and time and to encourage participation;
- intelligent transport systems (ITS) to reduce congestion and energy consumption;
- large-scale spread of smart grids and meters, zero energy buildings and intelligent systems for managing street lighting, in order to achieve energy saving goals and reduction of greenhouse gas emissions.

The EC considers appropriate to promote cooperation between the ICT industry, other sectors and public administrations in order to accelerate the development and widespread use of ICT based solutions for smart grids and meters, near zero energy buildings and intelligent transportation systems.

The ICT sector in fact provides these organizations for the modeling, analysing, monitoring and visualizing tools to assess the energy performance and emissions of buildings, vehicles, companies and cities. Smart grids, however, need to have a knowledgement and a social capital who knows how to operate, in order to prevent that a lack of expertise by users in the field of computer literacy could be an obstacle to the development of this potential.

To this end, this EU document considers essential "to educate European citizens to use ICT and digital media. This calls for multi-stakeholder partnerships, increased learning, recognition about digital competences in formal education and training systems, as well as awareness raising and effective ICT training and certification outside formal education systems" (EC, 2010). In order to support awareness raising activities, EC has established the European Week of Digital Skills.

Among the three documents analyzed the Urban Agenda represents explicitly the urban dimension of EU policies. The prototype of the city targeted to a smart, sustainable and inclusive growth is a city that invests in infrastructure and services based on technological innovations, its priorities are closely related to the specific national, regional and local needs, as well as energy and environmental sustainability.

Therefore according to Urban Agenda the future urban and territorial development of Europe should:

- be based on a multi-level governance;
- sub-delegate to local authorities for the adoption of strategic decisions and investment of public resources;
- focus on integrated strategic planning, facilitating local authorities in the transition from an approach in terms of individual projects to a cross-sectoral approach, "with greater strategic depth in order to enhance their potential for endogenous development" (EC, 2011);
- start new partnerships between the public and private sectors in order to attract investment and stimulate the economy.

The importance of this document within the European urban and regional policy framework is to recognize urban areas as places and drivers of change and to reformulate the objectives and policies of the European Union in key of urban development.

3 EU GOVERNANCE ACTIONS ORIENTED TO SMART CITY

Over the past decade EU's efforts have been focused on solving specific problems (climate change, air pollution, etc.), in order to improve life in the Member States; the urgency to afford these issues is strongly linked to the entity of their effects, on the one hand, and to the increasing public attention, on the other hand. The realization that the development of effective actions of resolution requires the integration between different aspects, so far dealt with individually, has allowed EU to consider as fundamental the territorial dimension and, therefore, to give city a privileged role within Community policies and programs.

For this reason, EU has defined the strategy and the objectives that wants to achieve by 2020 basing on integrated and coordinated actions at the urban scale and these targets are well-established not only at European level but at Member State level too. Europe 2020 strategy represents the first attempt to sort and organize the set of Community policies related to different sectors of intervention.

EU has recently started to get out of a sector-based logic, by adopting one that is more effective and commensurate with the multi-dimensionality and complexity of problems that has to face: the consequence of the transition to a holistic and systemic approach, therefore, has had as consequence the emergence of the urban question as a priority issue.

In addition to feel the need to "work" in an integrated manner to curb the negative effects of numerous phenomena in place, the awareness that the roots of many problems should be mainly found in the functioning and organization of urban systems has come up.

In other words, the step that EU is trying to accomplish is to propose new forms of urban development and governance in order to prevent the problems that until now have been solved *a posteriori*. This process is still at an early stage as many aspects of urban development have not been determined yet, and, for example, there is not any definition at EU level of "territorial cohesion". Actually, the most interesting aspect for scholars and urban planners is the recognition of the central role played by the city in the process of economic and social growth of European Union. Even though cities are the places where problems such as unemployment, pollution, poverty and segregation are more pronounced, at the same time they are defined as "the engines of the European economy", are regarded as "catalysts of creativity and innovation" and have a crucial role "in the implementation of the Europe 2020 Strategy" (EP, 2011).

Although the scientific debate on Smart Cities is still underdeveloped, the aspects that EU considers essential within its urban and territorial development policy can be defined by referring them both to the debate on Smart Cities so far developed, and sectors and applications that industries and companies tag as Smart.

Therefore is still premature to expect that at the European level "urban development" is meant a "smart" development; this adjective is, in fact, most commonly used to denote single elements of the urban system

(transport infrastructure, ICT and energy), rather than the overall organization of the city. Based on this consideration, we tried to identify features and governance actions oriented to connote the city as smart, through the integrated reading of EU documents. According to the literature, it is possible to define a set of fundamental factors which make a city smart: technology (infrastructures of hardware and software), people (creativity, diversity, and education), and institution (governance and policy). Given the connection between the factors, a city is smart when investments in human/social capital and IT infrastructure fuel sustainable growth and enhance a quality of life, through participatory governance (Nam and Pardo, 2009).

Most these features are contained in the three documents analyzed and their integrated reading allows to extrapolate the four main actions, listed below, that European cities should be undertaken in the near future, in order to achieve a smart, sustainable and inclusive growth:

- adopting models of multi-level governance through the distribution of responsibilities between different government and institutional levels;
- promoting integrated urban policies by adopting a holistic and strategic approach;
- focusing on new information and communication technologies (ICT) in order to provide citizens for new media opportunities and easier access to the public and cultural contents;
- ensuring a sustainable territorial development based on the efficient use of resources.

According to the model proposed in the first action, the highest levels of government establish general development guidelines and wide discretion is left to the lower levels (Sabel and Zeitlin, 2008). In this way the development actions can more easily adapt to specific and urban settings that, it is hoped, should also coordinate horizontally all subjects and local institutions that play a decisive role in the identification of citizen preferences of specific territories (Barca, 2009). The multi-level governance has been mainly developed in the domain of EU cohesion policies that support the active role of governments and local communities in the direct management of the interventions. In this regard, in particular, the Urban Agenda emphasizes that the "local needs" are the "European priorities" and that multi-level governance "properly functioning" and a high participation of regional and local authorities can lead to the success of urban development policies.

The second action refers to the integration both of interventions in urban and economic resources made available by the EU, that are indispensable for their implementation. EU gives cities the opportunity to design and implement strategies fully integrated by providing multi-fund operational tools and cross-financing. If "the city is time and space", as stated in Cohesion Policy document, the integration should take place both at spatial level (region, metropolitan area, district) and at temporal level, combining short and long term strategies depending on the specificity of the actions. In addition, a strategic approach to plan urban development scenarios should be adopted, starting from the specific characteristics of each urban area and sharing the development prospects with the several actors involved on the basis of partnership principle. Finally, the definition of policies should require a holistic approach suited to the complexity of urban areas; this kind of approach would mitigate not only the negative externalities produced within urban systems, but also would reorganize the urban system through a more effective network of relationships between the elements that compose it, in order to act on the causes rather than the effects.

According to the third action great attention should be payed to some peculiar characteristics that since the beginning of the scientific debate have featured a smart city. The main difference between a smart city and a "sustainable city" is the use of ICTs (Papa, Gargiulo, Galderisi, 2013) which may derive from the fact that the concept of smart city has begun to attract interest when the ICTs first reached a wide audience in European countries (Nijkamp et al, 2009). Unlike those who believed that ICTs would have replaced social relations and created an intangible space alternative to the physical, evidence have exclusively revealed the

complementary nature of these technologies to the functioning of urban systems. Thus, ICTs are a support tool to the development of human activities and their use, as well as reaffirmed in the Digital Agenda, is aimed at improving the quality of life of citizens, thanks to greater efficiency and speed of services that these technologies are able to offer. Following this approach, within the objectives of Digital Agenda there is not only the digital infrastructurization of the Member States but also the activation of a process of digital literacy so that "social background or skills are not a barrier to the development of potential" offered by ICTs. The city is "designed and equipped as a great functional and territorial infrastructure to support the society and economy of the country" (Niger, 2012), and the role of ICTs is not to erase the relationships and social exchanges but rather to make the basic services more affordable and more efficient such as education, health, transport, etc. As well as the machines have not replaced the man during the industrial revolution, ICT cannot replace "analog" interactions, but only make things easier.

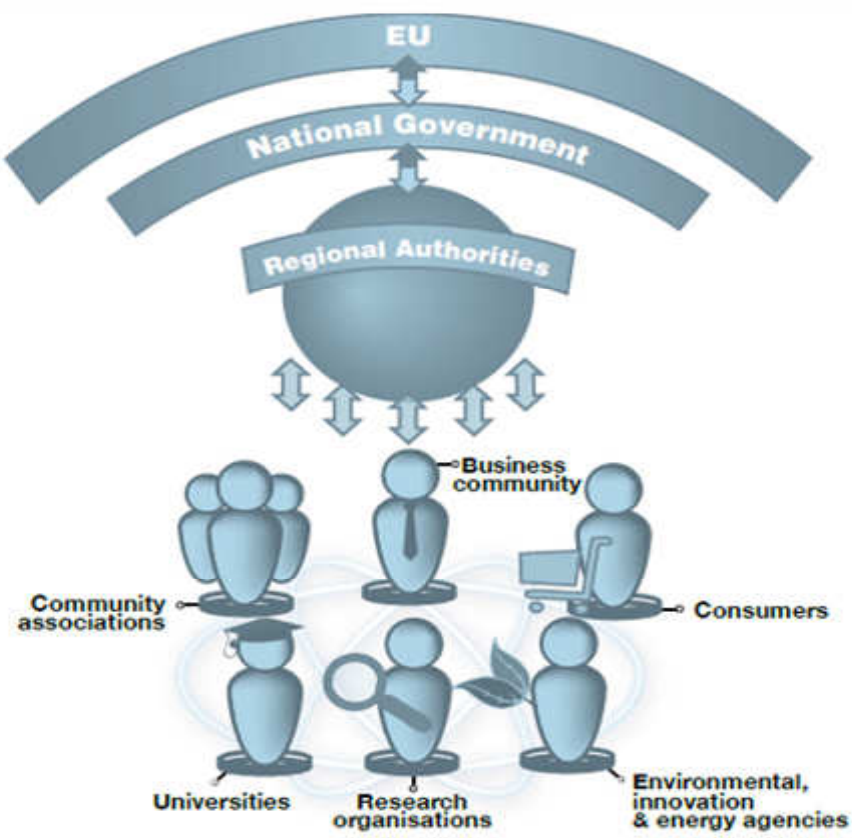

Fig. 7 – Connecting regional actors for the promotion of sustainable growth

Finally, the fourth action of sustainable growth is one of the three priority areas on which the Europe 2020 Strategy is based on, and is oriented to promote a more efficient economy in terms of resources through the deployment of smart grids and green technologies, carbon emission reduction of and improving energy efficiency. It is clear that the achievement of sustainable growth objectives is closely linked to the concept of technological innovation seen as "the key to succeeding in the de-coupling of growth from environmental degradation and consumption research" (EC, 2012b). At the same time technological innovation is the factor that allows to link the environmental and economic goals permitting that smart and sustainable growth can occur hand in hand. EU privileges regional and local levels to connect the sustainable and smart development, thanks to technological innovation. Local actors have, in fact, a greater knowledge of the territorial specificities and can therefore propose specific guidelines on how to prevent and adapt to

environmental challenges. To this end, among the investment priorities at local level, ERDF take into account investments in infrastructure providing basic services to citizens in the areas of energy, environment, transport and information and communication technologies (ICTs). Urban Agenda also notes that cities can make a substantial contribution to the fight against climate change, for example through intelligent systems for local public transport, energy refurbishment of buildings, and a sustainable urban planning that minimizes distances from work, from urban infrastructure, etc..

Moreover, the Urban Agenda as well as the Digital Agenda, draws attention to the great potential of ICT in order to deal with climate change, reduce energy consumption and improve transport efficiency. ICT, in fact, "may promote structural change towards products and services that require a more limited use of resources, towards the realization of energy savings in buildings and electricity networks and more efficient and less energy-intensive intelligent transport systems" (EC, 2010a).

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Figg. 1,2, 5, 6: ec.europa.eu; Fig. 3: www.ires.piemonte.it; Fig. 4: European Commission (2013), "Digital Agenda Scoreboard 2013"; Fig. 7: fesr.regione.emilia-romagna.it;

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REVIEWS PAGES

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

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.

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02_BOOKS
The books review suggests brand new publications related with the theme of the journal number.

author: FLORIANA ZUCARO
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03_LAWS
The Law section proposes a critical synthesis of the normative aspect of the issue theme.

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04_URBAN PRACTICES
Urban practices describes the most innovative application in practice of the journal theme.

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05_NEWS AND EVENTS
News and events section keeps the readers up-to-date on congresses, events and exhibition related to the journal theme.

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01

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

REVIEW PAGES: WEB RESOURCES

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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

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

REVIEW PAGES: BOOKS

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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.

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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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03

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

REVIEW PAGES: LAWS

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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

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04

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

REVIEW PAGES: URBAN PRACTICES

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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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WEB SITES

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IMAGE SOURCES

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05

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

REVIEW PAGES: NEWS AND EVENTS

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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.

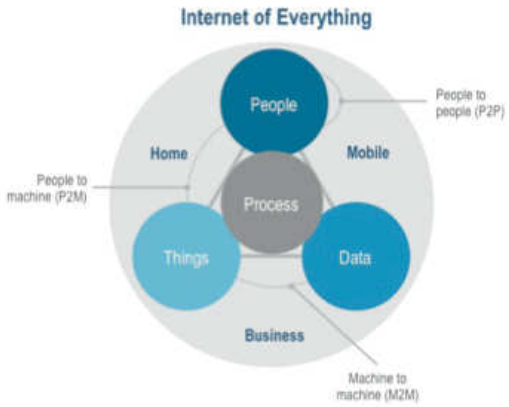

Fig.1 - IoE Brings Together People, Process, Data, and Things To Make Networked Connections More Relevant and Valuable.

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

http://globaltransportforum.com/smart-rail-europe/

http://www.ieee.org

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

http://www.intertraffic.com

http://www.it-trans.org

http://www.icsgistanbul.com/

http://thesmartgridssummit.com/

http://wsew.jp/en/

IMAGE SOURCE

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

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