TeMA

Journal of Land Use, Mobility and Environment

There are a number of different future-city visions being developed around the world at the moment: one of them is Smart Cities: ICT and big data availability may contribute to better understand and plan the city, improving efficiency, equity and quality of life. But these visions of utopia need an urgent reality check: this is one of the future challenges that Smart Cities have to face.

Tema is the Journal of Land use, Mobility and Environment and offers papers with a unified approach to planning and mobility. TeMA Journal has also received the Sparc Europe Seal of Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ).

CITIES, ENERGY AND BUILT ENVIRONMENT

Vol.8 n.2 August 2015

print ISSN 1970-9889 e-ISSN 1970-9870
University of Naples Federico II

TeMA

CITIES, ENERGY AND BUILT ENVIRONMENT

2 (2015)

Cover image: The ZCB Zero Carbon Building, designed by Ronald Lu & Partners, conceived to promote a low carbon emission lifestyle and to be a showcase of technologies to initiate a cultural change.

TeMA

Journal of
Land Use, Mobility and Environment

CITIES, ENERGY AND BUILT ENVIRONMENT 2 (2015)

Contents

TeMA

Journal of
Land Use, Mobility and Environment

SMART CITY, METROPOLITAN AREAS AND COMPETITIVENESS

THE CASE STUDY OF FLORENCE

CARMELA GARGIULO[a], MARIA ROSA TREMITERRA[b]

[a,b]Department of Civil, Architectural and Environmental Engineering
(DICEA) – University of Naples Federico II
e-mail: [a] gargiulo@unina.it, [b] mariarosa.tremiterra@unina.it
URL: [a] www.dicea.dip.unina.it

ABSTRACT

The many challenges currently faced by cities around the world require the adoption of innovative strategies and actions. Among the various paradigms, many urban development processes have taken on board the paradigm of the Smart City, which is emerging strongly in the European context. Through the application of new technologies in different areas of the urban system, the paradigm aims to enhance quality of life and wellbeing of local communities and promote the creation of a more efficient, sustainable and competitive urban system. Furthermore, in Italy the major cities are also undergoing territorial and administrative reorganization, following approval of Law 56/2014 establishing the Metropolitan City as the governing authority of metropolitan areas. Research conducted on some of the Italian metropolitan areas has sought to ascertain whether and how the adoption of the Smart City paradigm could contribute to the constitution of metropolitan governance. Through a review of the scientific literature on the Smart City and territorial competitiveness and through the analysis of policies and initiatives implemented in some metropolitan areas, several relationships between the Smart City and territorial competitiveness have emerged. Above all, one of the cities that has invested more on increasing its own territorial competitiveness through the adoption of the Smart City paradigm is Florence. Hence this paper, after describing the relationships emerging from the scientific literature between Smart Cities and territorial competitiveness, examines the policies and measures adopted in Florence for the constitution of the Metropolitan City.

TeMA

有关土地使用、交通和环境的杂志

智能城市，都市圈和竞争力

佛罗伦萨个案研究

CARMELA GARGIULO[a], MARIA ROSA TREMITERRA[b]

[a,b]Department of Civil, Architectural and Environmental Engineering
(DICEA) – University of Naples Federico II
e-mail: [a] gargiulo@unina.it, [b] mariarosa.tremiterra@unina.it
URL: [a] www.dicea.dip.unina.it

摘要

在一些城市中，对一种新型发展过程的定义开始出现，其重点是新科技在城镇体系不同领域中的使用和应用。这种新型发展过程旨在提高生活质量、当地社区的健康以及促进一种更加高效、可持续的城市系统的建立，使其更具竞争力。都市圈的重组问题就结合了这样的过程，响应了最近批准的德里奥法，该法将意大利的大都会作为都市地区的管理机构。智能城市、都市圈和竞争力是本文的三个主题，目标则是以佛罗伦萨为个案研究对象，结合这三个主题就佛罗伦萨大都会采用的最具创新性的政策和活动进行说明。

1   INTRODUCTION

Currently, cities have to face several challenges simultaneously, including rapid urbanisation and the effects of the economic and social crisis. In several urban contexts a new development process is being defined, focusing on the use and application of new technologies in different areas of the urban system. This new development process aims to improve the quality of life and wellbeing of local communities, besides seeking to promote the creation of a more efficient, sustainable and competitive urban system.

In addition to such challenges, the major Italian cities are also undergoing administrative and territorial reorganization under Law 56/2014 (called the Delrio Law) which envisages "Provisions on Metropolitan Cities, on Provinces, on unions and mergers of Municipalities". In this regard, part of the research project entitled "SEM Project - Smart Energy Master for the energy management of territory", developed at the University of Naples (DICEA), analysed several metropolitan areas in Italy in order to ascertain whether and how the adoption of the "paradigm" of the Smart City could contribute to implementing the process of constituting the Metropolitan City in Italy.

Given the many definitions of the term Smart City, our points of reference for this study were the definition used by Giffinger et al. (2007) and that in the report "Mapping Smart Cities in the EU" (European Parliament, 2014). As regards the former, according to Giffinger et al., in the Smart City six dimensions can be identified. One of these is the Smart Economy, which refers to the activation of development processes that increase the competitiveness of urban systems. Indeed, it emerged from our research findings that some metropolitan areas, such as Florence, have invested in policies and actions aimed at implementing the Smart City in order to increase their competitiveness in key sectors of their economy.

Therefore, after describing the relationships identified in the scientific literature between the Smart City and territorial competitiveness, this paper describes the policies and measures adopted in Florence, regarding the sector of cultural heritage and tourism, for the constitution of the Metropolitan City. It is divided into three parts: the first provides a review of the scientific literature about the Smart City and territorial competitiveness; the second explains the research methods adopted in the study; finally, the third illustrates the case study of the Metropolitan City of Florence.

2   SMART CITY AND TERRITORIAL COMPETITIVENESS. THE COGNITIVE FRAMEWORK

There is a broad consensus in the scientific literature on territorial competitiveness that cities are central to the organization and leadership of economic growth and territorial development. Considering the profound changes in economic, social and technological processes caused by globalization and integration, cities around the world are facing the challenge to balance territorial competitiveness with environmental sustainability (Caragliu et al., 2009; Monfaredzadeh and Berardi, 2014; Paskaleva, 2014). In this context, one of the main paradigms that is becoming firmly established, namely the Smart City, could contribute to define strategies to address such a challenge. Yet the relationship between the Smart City and territorial competitiveness is not obvious, although analysis of their features and objectives shows overlaps and relations between these two topics.

Although the lack of a shared definition of the Smart City has been widely discussed (Angelidou, 2014; Allwinkle and Cruickshank, 2011; Chourabi et al., 2012; Komninos, 2011; Lombardi et al., 2012; Nam and Pardo, 2011; Papa et al., 2013; Wolfram, 2012), also due to the different nature of the subjects that have developed such definitions - academia, public institutions, multinational companies - (De Luca, 2014; Mosannenzadeh and Vettorato, 2014), a review of some definitions clearly shows the linkages with competitiveness, that can be considered one of the objectives of the Smart City (Table 1).

Definition	Reference
The 'smart city' has recently been introduced as a strategic device to encompass modern urban production factors in a common framework and, in particular, to highlight the importance of Information and Communication Technologies (ICTs) in the last 20 years for enhancing the competitive profile of a city.	Caragliu et al., 2009
The Smart Cities concept is connected to notions of global competiveness, sustainability, empowerment and quality of life, enabled by broadband networks and modern ICTs. Its implementation requires the development of migration paths regarding Internet infrastructures, test bed facilities, networked applications, and stakeholder partnerships.	Komninos et al., 2011
A smart city is a synthesis of hard infrastructure (or physical capital) with the availability and quality of knowledge communication and social infrastructure. The latter form of capital is decisive for urban competitiveness (…) Smart Cities are also instruments for improving competitiveness in such a way that community and quality of life are enhanced.	Batty et al., 2012
Smart cities are the result of knowledge-intensive and creative strategies aiming at enhancing the socio-economic, ecological, logistic and competitive performance of cities.	Kourit and Nijkamp, 2012
(The concept of) a 'smart city' represents a positively valued, multi-objective policy strategy of integrated urban and ICT development, promising to tackle problems of economic competitiveness, social equity and environmental performance - somehow. Such a strategy attracts stakeholders for its ability to reduce complexity and provide capacity.	Wolfram, 2012
Smart cities are all urban settlements that make a conscious effort to capitalize on the new Information and Communications Technology (ICT) landscape in a strategic way, seeking to achieve prosperity, effectiveness and competitiveness on multiple socio-economic levels.	Angelidou, 2014

Tab.1 Smart City definitions content references about competitiveness

In this regard, according to Giffinger et al. (2007), the Smart City is an opportunity to increase the competitive potential, above all, of the average size city, defined as "a city well-performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self decisive, independent, and aware citizens", where economy, people, governance, mobility, environment, and living are the six characteristics that can be recognized in the Smart City, based on the traditional theories on urban growth and development, such as economic competitiveness, intellectual capital and social participation in society, transport and ICT, natural resources and quality of life (Albino and Dangelico, 2015). The multiple dimensions within the Smart City are also stated in other studies (e.g., Barrionuevo et al., 2012; Batty et al., 2012; Chourabi et al., 2012; Schumann et al., 2012). In particular, the most common of these concern people's wellbeing and quality of life, as well as the economic development of the city.

The relationship between the Smart City and territorial competitiveness is more evident when analyzing the elements that characterise territorial competitiveness. As for the "paradigm" of Smart City, the scientific literature contains several definitions of territorial competitiveness, a subject borrowed from mainly economic studies. According to some authors, competitiveness is synonymous with productivity (Porter, 1996; Fagerberg, 1996; Boltho, 1996). With such a meaning, it is influenced by factors such as the effectiveness of institutions, sectoral specialisation, the spread and quality of infrastructure, and other factors that can support productivity, including the use of new technologies and investment in intellectual capital. The meaning of territorial competitiveness has evolved from one focusing on the ability of a region to attract investment (Cheshire and Gordon, 1996; D' Arcy and Keogh, 1999; Kresl and Singh, 1999) to another centred on the capacity to maintain high standards of living for inhabitants (Lever and Turok, 1999; Malecki, 2000) in a sustainable way (Begg, 2002; Constantin, 2006; Filo, 2014). Such a shift in the meaning of territorial competitiveness, considering what was stated by Giffinger et al. (2007) and other researchers of

the Smart City, shows that regional competitiveness con be considered as one of its properties (Murray et al., 2011; Chourabi et al., 2012).

The study of the Smart City and territorial competitiveness features allows further relationships to be identified. According to a significant part of the literature dedicated to the Smart City, social and intellectual capital is, on the one hand, the basic condition for the implementation of the Smart City paradigm (Hollands, 2008; Paskaleva, 2014) and, on the other, an important endowment that, combined with the use of ICT (Alawadhi et al., 2012; Chourabi et al., 2012), can steer urban development. Indeed, it has been argued (see, amongst others, Caragliu et al., 2009; Touzar, 2011; Kourtit and Nijkamp, 2012) that investing in intellectual and social capital promotes sustainable economic growth, a high quality of life and the competitive performance of cities.

Social and intellectual capital is also a key aspect of territorial competitiveness. The study of the scientific literature also shows that territorial competitiveness is related not only to innovation, but also to the degree of knowledge and learning capability of a territory (Bramanti, 1998; Camagni, 2002; Benneworth, 2007; Murray et al., 2011). These elements are also common features of the Smart City (Abdoullaev, 2013; Sinkiene et al., 2014). For example, according to Hollands (2008) and Komninos (2011), Smart Cities "are territories with a high capacity for learning and innovation, which is built-in to the creativity of their population, their institutions of knowledge creation and their digital infrastructure for communication". Up to this point the relationships arising between Smart Cities and territorial competitiveness support the conclusion that a "smart" city is also competitive when it invests in social and intellectual capital in order to enhance the degree of knowledge and learning capability and promote the development of innovation within the region.

Another common element between the Smart City and territorial competitiveness concerns the form of governance to adopt. According to some authors (including, Caragliu et al., 2009; Nam and Pardo, 2011; Komninos et al., 2011), implementation of the Smart City necessarily requires the development of a particular form of governance. The scientific literature has mainly referred to a form based on the model of the "Triple Helix" of Etzkovitz and Leydesdorff (2000). This model is considered a selective environment for creating knowledge and innovation, which promotes strategies able to exploit intellectual and social capital to induce a "new urban vitality" (Lombardi et al., 2012) and it is characterised by the interaction of three different kinds of actors:

− University: it enhances the value of scientific research products on the market so as to increase the sources of funding for public research;

− Government: it increases the effectiveness of governance through administrative decentralization measures;

− Industry: it incentivises collaboration with universities in order to use the results of scientific research.

The above actors, who are in a perpetual evolution, interact flexibly on different territorial levels, seeking to achieve their own objectives, whilst satisfying those of the other two parties concerned (Fixari et al., 2009).

The authors of this model argue that the network formed by these actors creates necessary conditions to produce knowledge, create economic wealth and control development of urban regions (Leydesdorff and Deakin, 2011). Lombardi et al. (2011) recently proposed a review of this model that includes society as the fourth key actor. The innovation of this model consists in the four "helices" that operate in a complex urban context, where civil commitment with intellectual and social capital stimulates relations among the traditional "helices" - university, government and industry. The interaction between these actors and these forces allows the achievement not only of a "smart" but also competitive development of the city. Indeed, the necessity of governance that involves various subjects and institutions also represents one of the requisites to increase territorial competitiveness (Bramanti, 1998; Camagni, 2002), with the purpose to exploit the intellectual and social capital and promote the development of innovative systems based on knowledge and

learning. According to Fixari et al. (2009) there are two possible approaches to promoting the economic development of an area: the creation of industrial clusters (e.g., centres of competence); the adoption of the triple-helix model. The latter approach, rather than the former, would allow the creation of a structure, led by governments, to promote relations and cooperation between the research world and the business world to encourage innovation through the development of R&D projects. For these reasons, the "triple helix" (or "quadruple helix") model is also an efficient tool to increase the territorial competitiveness of the Smart City. Hence, from the analysis of definitions and characteristics, it emerges that although the relationship between the Smart City and territorial competitiveness may seem somewhat stretched, the two elements are closely related. In particular, innovation and knowledge processes affecting territories, thanks to the opportunities offered by ICT, are a chance to increase the attractiveness and competitiveness of a region, but only if supported by *multi-actor governance*.

3   RESEARCH METHODS

From the review of the scientific literature, it emerges that the paradigm of the Smart City can be an effective strategy to increase the competitiveness of a territory. For the case study of the Metropolitan City of Florence it was necessary to choose a working definition of the Smart City. Among the several definitions provided by the literature, the one included in the report "Mapping Smart Cities in the EU" (European Parliament, 2014) was chosen as a reference point: "a Smart City is a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership". This definition highlights the key role that technology can play in resolving issues at the urban scale. At the metropolitan scale, ICTs should allow area connectivity and decrease the physical and functional gap between the metropolitan city and its hinterland. Furthermore, it highlights that implementation of the Smart City must be committed to a form of multi-actor governance involving the main stakeholders of local innovation processes: enterprises, research centres, governments and society.

The study of the "smartness" of the Metropolitan City of Florence was developed in three phases. The first entailed a survey of the physical, functional and settlement characteristics of the metropolitan area.

In order to draw up a profile of the metropolitan area and measure its potential level of "smartness", in the second phase, a set of indicators structured around the six characteristics (Economy, People, Environment, Living, Mobility and Governance) of the traditional model of the Smart City (Giffinger et al., 2007; Batty et al., 2012; Schuuman et al., 2012) was chosen. To select these indicators the criteria used were the following:

− significance of the indicator in describing metropolitan "smartness";
− use and recurrence of the indicator in the most relevant studies both on the national and the European scale;
− accessibility to official databases;
− availability of data at different territorial scales and temporal phases.

The last phase of the study entailed the screening of Smart City initiatives underway in the metropolitan area. At the beginning, the aim was to identify the initiatives promoted by the main area stakeholders – institutions, research centres and universities, enterprises and associations – through the use of indirect sources, such as instruments for urban and territorial government, web sites of the stakeholders potentially involved in the initiatives, as well as publications.

As regards the definition of the six characteristics of the Smart City (Giffinger et al., 2007), the measures selected in the metropolitan area were those focusing on ICT use and application in several sectors of the urban system (mobility, building, technological networks), but also in public administration and in the services provided to citizens and city users. These initiatives were then classified according to the Smart City characteristics by type and actor (Table 2).

Afterwards, the most significant initiatives of the metropolitan area were chosen among those studied, to carry out "fact checking". The criteria for the choice were:

— level of innovation related to the capacity to contribute to the institution of the Metropolitan City;

— replicability of the initiative in other territorial contexts;

— importance of the initiative in terms of impacts (economic, social and environmental) on the city.

Characteristic	Typology	Implementing Subject
Smart Economy	Research	Local Authorities/Institutions
Smart Environment	Works	Universities/Research Centers
Smart Governance	Projects	Enterprises
Smart Living	Technologies/Products	Associations
Smart Mobility	Plans and Programs	
Smart People	Promotion initiatives	

Tab.2 Classification criteria for Smart City initiatives

Through the collection of "field" data, it was possible to verify the implementation status of the initiatives and their consistency with urban policies adopted in the metropolitan area. A further contribution to the analysis of the initiatives was given by the study of land use policy of the Tuscany Regional Authority, focusing both on the local and metropolitan scale. It was thus possible to contextualise the current initiatives of the metropolitan area within a political strategy to increase territorial competitiveness through the implementation of the Smart City.

4   CASE STUDY: THE METROPOLITAN CITY OF FLORENCE

The Metropolitan City of Florence is located in the central part of Italy. With its population of 973,145 inhabitants, it is the 9th most populous Italian metropolitan area, including 42 municipalities over an area of 3,513.69 km^2. Its administrative centre is the City of Florence which occupies an area of over 103 km^2 and has a population of 358,079 (Fig. 1).

Tourism and cultural heritage play a strategic role in the local economy. Indeed, the Metropolitan City of Florence hosts 187 museums, 97 of which are in Florence. Among all the museums in Florence, the Uffizi Gallery and the Accademia Gallery are, respectively, the 3rd and 4th most visited museums in Italy (IRPET, 2011). Furthermore, Florence's cultural heritage is continuously expanding. Cultural heritage has given the opportunity to promote and sustain the tourism sector. According to the most recent available statistics (2013), accommodation in the Metropolitan City is supplied by 3,019 businesses with a total capacity of over 88,000 beds (Centro Studi Turistici, 2013). Half of such supply is concentrated in the city of Florence (1,095 businesses and 43,000 beds).

Several studies have revealed that cultural heritage has acquired increasing importance in different levels of the economy (Alberti and Giusti, 2012). In particular, there is an increasing awareness that areas might develop their competitiveness by taking advantage of their cultural heritage (Pereira Roders and Von Oers, 2011; Boix at al., 2012). In this context, tourism and cultural heritage play a key role because cultural assets produce tourism and tourism can attract new resources to the culture sector and enhance territorial competitiveness (Alberti and Giusti, 2012).
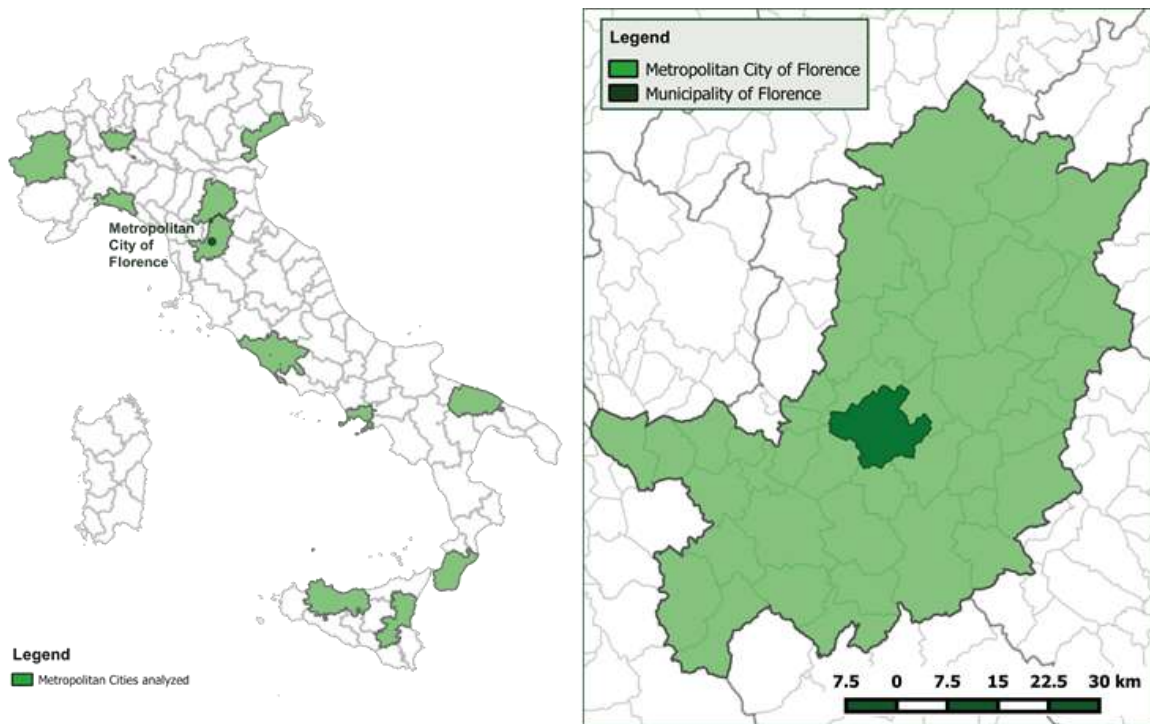
Fig. 1 The Metropolitan City of Florence map

Hence, the Metropolitan City of Florence has promoted processes for fostering knowledge and innovation - key elements for territorial competitiveness and the Smart City - in tourism and cultural heritage that constitute one of the key sectors of its economy. The adoption of "smart" solutions in this sector was also supported by Tuscany Regional Authority policies. One of the strategic directions of the "2011-2015 Regional Development Plan" drawn up by the Tuscany Regional Authority (2011a) concerns "competitiveness in the regional system and human capital". According to this strategic direction, the Plan sets out policies for tourism and culture that are based on innovation, research and development of new technologies. Such policies are also linked to the creation of technological districts and innovation poles (Table 3), which are clusters able to integrate small and medium enterprises and crafts related to tourism.

Clusters are "geographic concentrations of interconnected companies, specialised suppliers and service providers, firms in related industries and associated institutions (e.g., universities, standards agencies and trade associations) in particular fields that compete but also cooperate" (Alberti and Giusti, 2012). They can improve regional competitiveness because, supporting the relationships with institutions and addressing knowledge and information that are necessary for the development, they contribute to innovation processes (Ketels, 2011). In order to promote innovation, knowledge and technology transfer, according to Communication no. 323/2006 of the European Commission, since July 2011 the Tuscany Regional Authority has instituted several innovation poles and technological districts, including the *Tuscan Technological District for Cultural Heritage* and *POLIS (Innovation Pole of Technologies for a Sustainable City)*. The *Tuscan Technological District for Cultural Heritage and the Sustainable City* (*DiT-BeCS*) promotes the constitution and the strengthening of research, innovation and enterprise systems to create successful local products and services in the cultural and landscape heritage sector for international markets. One of the main objectives of the *DiT-BeCS* is involvement of all the actors able to support innovative processes in order to create a virtuous "triple helix" that could promote the economic and territorial development of the region. At present, the district involves several research actors (University of Florence, University of Siena, Normal School of Pisa, CNR) and enterprises (EL-EN, Archeologia, Hyperborea, Pacenti Restauri, Targetti), but also public administrations (Metropolitan City of Florence, Province of Prato, Province of Pistoia, Pistoia Futura, Municipality of Florence) and associations.

	Technology District	**Innovation Pole**
Objectives	R&D with territorial impact	Exchange of knowledge, sharing of facilities and technology transfer among who adhere to the pole
Sustainability	Sustainability is guaranteed in the medium/long-term involvement of financial community and institutional investors who enter the governance of the District and replace public finance	Sustainability is guaranteed in the medium term from management of facilities and delivery/acquisition of qualified services to companies that adhere to the pole
Governance	It is representative of companies and research institutions	It is representative of firms and actors who provide services to businesses
Project activities	Few large projects and industrial research	Many acquisition activities of qualified services
Effects	Medium/long term	Medium/short term

Tab.3 Main Differences between technology districts and innovation poles (SOURCE: Tuscany Region, 2011b)

POLIS (*Innovation Pole of Technologies for a Sustainable City*) represents the technical secretariat of *DiT-BeCS* and was promoted by the Foundation for Research and Innovation (University of Florence with Province of Florence), in cooperation with other actors in the field of research and in the promotion of the technology transfer (I2T3, University of Pisa, University of Siena, Lucense, CNR and APSLO). It is a structured network of SMEs, large enterprises and research centres (about 500 subjects) and it develops actions and projects aimed at urban sustainability. Its main activities concern: cultural heritage and sustainable tourism; sustainable mobility; sustainable buildings. Moreover, it plays a key role in the "SmartCommunitiesTech" cluster promoted by the Ministry of Education, University and Research (MIUR) and coordinated by Torino Wireless Foundation. Specifically, POLIS is involved in one of the cluster's projects, namely the project concerning technologies for cultural heritage.

The City of Florence has implemented some initiatives in areas covered by the Technological District. One of these initiatives is the *Le Murate Urban Innovation Park*. *Le Murate* is located in the historic centre of Florence and is a former prison recovered to create spaces dedicated to innovative enterprises for cultural heritage and the sustainable city. The basic idea of *"Le Murate"* is to promote a model of incubation with pre-incubation services, incubation and enterprise aggregation, focusing on cultural heritage, artistic crafts and new technologies. Currently, nine ICT enterprises occupy special furnished spaces, which were created in the requalified complex as an *urban lab*. The *Urban Park* also contains the common services of the *Tuscan Technological District*, including: the Metalab University-Enterprise about cultural heritage; spaces to organise cultural events (SUC, Bookstore, Literary Café, etc.); locations for co-working. Furthermore, it operates in synergy with the network of Florentine incubators, which includes the *Technological Incubator of Brozzi* (City of Florence) and the *University Incubator of Sesto Fiorentino*.

Among the *prospective projects* supported by *DiT-BeCS* there is the promotion of the *Social Museum*. The *Social Museum* is integrated with the topic of the Smart City, especially in: the implementation and spread of ICT-based urban and territorial services; the effects on the quality of life generated by cultural opportunities, tourist attractiveness and security, mobility management, local accessibility; the relation between administration and citizens for the provision of services. Many of the Smart City initiatives regarding the sector of cultural heritage and tourism, promoted by local governments, can be framed within the *prospective project* and be interrelated.

Fig. 2 Piazza delle Murate, core of the Urban Park of Innovation "Le Murate"

One such project was the framework *MyFirenze*, promoted by the City of Florence and activated since 2014 in the Multimedia Centre for City Visitors to Santa Maria Novella train station. It is realized in collaboration with the Media Integration and Communication Centre (University of Florence) and its aim is to enable tourists to plan their trips and optimise their time to visit the city. At first, the tourist finds the information at the tourism information centre and he/she defines the trip itinerary using natural interaction systems (tabletop and wall); then the personal plan is visualized on his smart phone, enabling access to advanced services and for updating the itinerary.

Another initiative is *firenzeturismo.it*, promoted, instead, by the Metropolitan City (former Province) of Florence. Completed during 2013, this initiative consists in a back office to update the database of the cultural events organised in the local area and in an *app* that can be downloaded by all users in order to be updated on all the tourist attractions and the cultural events in the metropolitan area. The official tourist website of the Metropolitan City and the City of Florence was reorganised within the project. The key aspect of this initiative is the integration between the infomobility services (*imobi.fi.it*) and the synergies with the local wi-fi network. The database is connected with the framework of the Multimedia Centre for City Visitors as well.

The main aim of such initiatives is to provide innovative services to the tourists, whose profile is changing both rapidly and profoundly. Hence, it is necessary not only to implement measures to improve the city's image, but also to enhance the user's direct and perceived experience. Therefore, according to tourist demand, local authorities are especially aiming to integrate tourism development with measures for enhancement of cultural resources with the support of new ICTs which allow not only an improvement in quality of service, but also strengthen local identity.

Fig. 3 The wall and the tabletop of framework MyFirenze at the Multimedia Center for City Visitors of Santa Maria Novella train station

5   CONCLUSION AND FUTURE WORK

From the *review* of the scientific literature, it emerged that although the relationship between the Smart City and territorial competitiveness may seem tenuous, the two topics are closely related. In the case study of Florence it was shown that knowledge and innovation not only increase competitiveness, but also allow the implementation of the Smart City. Through analysis of the initiatives, classified as "Smart Economy" and "Smart Living", concerning tourism and cultural heritage there emerged the presence of a well-structured network consisting of multiple stakeholders. As described in the sections above, their mutual interaction, inspired by the "triple helix" model, allows the development of innovation processes throughout the area concerned in one of the main economic sectors of the metropolitan territory. These processes are supported by the creation of shared platforms, both territorial (the Technological District and POLIS) and urban (the Urban Park of Innovation "Le Murate"). Thanks to such platforms, innovative and technological solutions can be designed and implemented to foster and promote cultural heritage so as to transform all cultural resources within the metropolitan area into a competitive advantage, thereby increasing the tourist attractiveness, improving quality of life and also promoting forms of sustainable economic development.

Therefore, if, on the one hand, the use of ICTs, connected with the potential of human and social capital, and *multi-actor governance* are key elements for the implementation of the Smart City, on the other, such elements contribute to increase local competitiveness. However, from the study of the Florentine initiatives it emerged that, despite the policies promoted at the regional level, there is a lack of planning for the promotion of culture and tourism at the metropolitan scale.

The scientific literature highlighted the relationship between territorial competitiveness and several strategic sectors (mobility, human capital, economy, production, research and training, environment) (Papa et al., 2014a; Papa et al., 2014b). At present, research concerns one of the aspects of *urban smartness*. According to the report "SMART CITIES STUDY: International study on the situation of ICT, innovation and knowledge in cities" (CDK-UCLG, 2012), in order to increase their territorial competitiveness cities should develop all the Smart City characteristics. Hence, in the future it would be preferable to evaluate the levels of territorial competitiveness in relation to the characteristics of the Smart City. This study could require the use of indicators to measure "smart competitiveness" of cities and in addition an analysis of the initiatives. Such an analysis could be structured on the basis of the three key aspects shared by the Smart City and territorial competitiveness: knowledge, innovation and governance. Thanks to these integrations, the development of this study could allow identification of the relations between the paradigm of the Smart City and territorial competitiveness.

REFERENCES

Abdoullaev, A. (2013). Building Smart Cities and Communities. Available at: http://eu-smartcities.eu/sites/all/files/blog/files/Building%20SMART%20CITIES%20EIP.pdf.

Alawadhi, S., Aldama-Nalda, A., Chourabi, H., Gil-Garcia, J.R., Leung, S.,Mellouli, S., Nam, T., Pardo, T.A., Scholl, H.J., & Walker, S. (2012). Building Understanding of Smart City Initiatives. Lecture Notes in Computer Science, 7443, 40–53. DOI: 10.1007/978-3-642-33489-4_4.

Alberti, F.G., & Giusti, J.D. (2012). Cultural heritage, tourism and regional competitiveness: The Motor Valley cluster. City, Culture and Society, 3 (4), 261-273. DOI: 10.1016/j.ccs.2012.11.003.

Albino, V., & Dangelico, R.M. (2015). Smart Cities: Definitions, Dimensions, Performance, and Initiatives. Journal of Urban Technology, 22(1), 3-21. DOI: 10.1080/10630732.2014.942092.

Angelidou, M. (2014). Smart city policies: A spatial approach. Cities, 41 (S), S3-S11. DOI: 10.1016/j.cities.2014.06.007.

Barrionuevo, J.M., Berrone, P., & Ricart, J.E. (2012). Smart Cities, Sustainable Progress. IESE Insight, 14, 50–57.

Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukhov A., Bazzani, A., Wachowicz, M., Ouzounis, G., & Portugali, Y. (2012). Smart Cities of the Future. European Physical Journal Special Topics, 214 (1), 481-518. DOI: 10.1140/epjst/e2012-01703-3.

Begg, I. (2002). Conclusions and policy implications. In: I. Begg (Ed.), Urban Competitiveness: Policies for Dynamic Cities, 311-327. Bristol, UK: Policy Press.

Benneworth, P., & Hospers, J. (2007). Urban competitiveness in the knowledge economy: Universities as new planning animateurs. Progress in Planning, 67 (2), 105-197. DOI: 10.1016/j.progress.2007.02.003.

Boix, R., Lazzeretti, L., Capone, F., De Propris, L., & Sánchez, D. (2012). The geography of creative industries in Europe. Comparing France, Great Britain, Italy and Spain. In L. Lazzeretti (Ed.), Creative industries and innovation in Europe: Concepts, measures and comparatives case studies. New York, USA: Routledge. ISBN: 978-0-415-67740-0.

Boltho, A. (1996). The Assessment: international competitiveness. Oxford Review of Economic Policy, 12(3), 1-16.

Bramanti, A. (1998). From Space to Territory: Relational Development and Territorial Competitiveness. The GREMI Approach within the Contemporary Debate. Proceedings of the conference "SMEs and districts: hybrid governance forms, knowledge creation & technology transfer", November 5-7, Castellanza, Italy. Available at: http://www.ilsleda.org/usr_files/papers/from%20space%20to%20t974931.pdf.

Camagni, R. (2002). On the concept of territorial competitiveness: sound or misleading? Urba Studies, 39 (13), 2395–2411. DOI: 10.1080/0042098022000027022.

Centro Studi Turistici. (2013). L'impatto economico del turismo in provincia di Firenze. Firenze, IT: Camera di Commercio. Available at: http://www.fi.camcom.it/default.asp?idtema=1&page=informazioni&action=read&index=1&idtemacat=1&idinformazione=28134.

Caragliu, A., Del Bo C., & Nijkamp, P. (2009). Smart Cities in Europe. Journal of Urban Technology, 18 (2), 65-82. DOI: 10.1080/10630732.2011.601117.

CDK-UCLG. (2012). Smart Cities Study: International study on the situation of ICT, innovation and Knowledge in cities. Bilbao, ES: The Committee of Digital and Knowledge-Based Cities of UCLG. Available at: http://www.cities-localgovernments.org/committees/cdc/Upload/formations/smartcitiesstudy_en.pdf.

Cheshire, P.C., & Gordon, I.R. (Eds). (1995) Territorial Competition in an Integrated Europe. Aldershot, UK: Avebury.

Chourabi, H., Nam, T., Walker, S., Gil-Garcia, J. R., Mellouli, S., Nahon, K., Pardo, A. T., & Scholl, H. J. (2012). Understanding Smart Cities: An Integrative Framework. Proceedings of the 45th Hawaii International Conference on System Sciences, January 4-7, Maui, USA, 2289-2297. DOI: 10.1109/HICSS.2012.615.

Costantin, D.L. (2006). Recent advances in territorial competition and competitiveness analysis. Romanian Journal of European Affairs, 6 (3), 71-81. ISSN: 1582-8271.

D'Arcy, E., & Keogh, G. (1999). The Property Market and Urban Competitiveness: A Review. Urban Studies, 36 (5-6), 917-928. DOI: 10.1080/0042098993277.

De Luca, A. (2012). Come (ri)pensare la smart city. EyesReg Giornale di Scienze Regionali, 2(6). Available at: http://www.eyesreg.it/2012/come-ripensare-la-smart-city/.

Etzkowitz, H., & Leydesdorff, L. (2000). The Dynamics of Innovation: From National Systems and 'Mode 2' to a Triple Helix of University-Industry-Government Relations. Research Policy, 29 (2), 109-123. DOI: 10.1016/S0048-7333(99)00055-4.

European Parliament. (2014). Mapping Smart Cities in the EU. Directorate-General for Internal Policies. Brussels, BE: Policy Department Economic and Scientific Policy. Available at: http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET(2014)507480_EN.pdf.

Fagerberg, J. (1996). Technology and competitiveness. Oxford Review of Economic Policy, 12(3), 39-51.

Filo, C. (2014). Indicators of territorial competitiveness. Proceedings of the International conference of Territorial Intelligence "Information, Indicators and Tools", May 29-31, Pecs, Hungary. Available at: https://halshs.archives-ouvertes.fr/halshs-00794668/document.

Fixari, D., Lefebvre, P. and Pallez, F. (2009). Competitiveness clusters and new approaches to public research: uncertainties in the development of the Triple Helix in France. Available at: http://cgs-mines-paristech.fr/wp-content/uploads/2012/05/LIEGE_final_anglaistriplehelice.pdf.

Giffinger, R. Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., & Meijers, E. (2007). Smart Cities: Ranking of European Medium Sized Cities. Vienna, AT: Centre of Regional Science of Vienna. Available at: http://www.smart-cities.eu/download/smart_cities_final_report.pdf.

Hollands, R. G. (2008). Will the real smart city please stand up? City, 12 (3), 303–320. DOI: 10.1080/13604810802479126.

IRPET. (2011). Musei della Toscana. Rapporto 2011. Tuscany Region, Florence. Available at: http://www.regione.toscana.it/documents/10180/320308/Musei+della+Toscana,%20rapporto+2013/0c1b0d8c-8cfe-436b-ae1d-5a1deba162e8;jsessionid=13D39CF297F8BE03182C43D8306EE7C7.web-rt-as01-p2?version=1.0.

Ketels, C. (2011). Clusters and competitiveness: Porter's contribution. In R. Huggins, & H. Izushi (Eds.), Competition, competitive advantage, and clusters: the idea of Michael Porter. Oxford, EN: Oxford University Press. ISBN: 9780199578030.

Komninos, N., Schaffers, H., & Pallot M. (2011). Developing a Policy road map for Smart Cities and the future internet. Proceedings of the eChallenges e-2011 Conference, October 26-28, Florence, Italy. ISBN: 978-1-905824-27-4.

Kourtit, K., & Nijkamp, P. (2012). Smart Cities in the Innovation Age. Innovation: The European Journal of Social Science Research, 25(2), 93–95. DOI: 10.1080/13511610.2012.660331.

Kresl, P. K., & Singh, B. (1999). Competitiveness and the urban economy: twenty-four large US metropolitan areas. Urban Studies, 36 (5-6), 1017-1027. DOI: 10.1080/0042098993330.

Lever, F. W., & Turok, I. (1999). Competitive Cities: Introduction to the review. Urban Studies, 36 (5-6), 791-793. DOI: 10.1080/0042098993213.

Leydesdorff, L., & Deakin, M. (2011). The Triple-Helix Model of Smart Cities: A Neo-Evolutionary Perspective. Journal of Urban Technology, 18 (2), 53-63. DOI: 10.1080/10630732.2011.601111.

Lombardi, P., Giordano, S., Farouh, H., & Wael, Y. (2011). An analytic network model for Smart cities. Proceedings of the 11th International Symposium on the AHP, June 15 – 18, Sorrento (Naples), Italy, 1-6. Available at: http://www.bsuredecisions.com/pdf/63_0116_Giordano.pdf.

Lombardi, P., Giordano, S., Caragliu, A., Del Bo, C., Deakin, M., Nijkamp, P., & Kourtit, K. (2012). An Advanced Triple-Helix Network Model for Smart Cities Performance. In Ercoskun O.Y., Green and Ecological Technologies for Urban Planning: Creating Smart Cities. Ankara, TR: Gazi University. DOI: 10.4018/978-1-61350-453-6.ch004.

Malecki, E. (2000). Knowledge and regional competitiveness. Erdkunde, 54, 334-351. DOI: 10.3112/erdkunde.2000.04.04.

Monfaredzadeh. T. & Berardi, U. (2014). How can cities lead the way into a sustainable, competitive, and smart future? WIT Transactions on Ecology and the Environment, 191(9). DOI: 10.2495/SC140902.

Mosannenzadeh, F., & Vettorato, D. (2014). Defining Smart City: a conceptual framework based on keyword analysis. TeMA Journal of Land Use, Mobility and Environment, 7 (special issue INPUT 2014), 683-694. DOI: 10.6092/1970-9870/2523.

Murray, A., Minevich, M., & Abdoullaey, A. A. (2011). The future of the future: Being smart about smart cities. KMworld, 20(9). Available at: http://www.kmworld.com/Articles/Column/The-Future-of-the-Future/The-Future-of-the-Future-Being-smart-about-smart-cities-77848.aspx.

Nam, T., & Pardo, T.A. (2011). Conceptualizing Smart City with Dimensions of Technology, People, and Institutions. Proceedings of the 12th Conference on Digital Government Research, June 12–15, College Park, MD, USA.

Papa, R., Gargiulo, C., & Galderisi A. (2013). Towards and urban planners'perspective on smart city. TeMA Journal of Land Use, Mobility and Environment, 6 (1), 5–17. DOI: 10.6092/1970-9870/1536.

Papa, R., Gargiulo, C., Franco, S., Russo, L. (2014a). Urban smartness vs. urban competitiveness. A comparison of Italian Cities Rankings. TeMA Journal of Land Use, Mobility and Environment, 7 (special issue INPUT 2014), 771–782. DOI: 10.6092/1970-9870/2555.

Papa, R., Gargiulo, C., Franco, S., & Russo, L. (2014b). Measuring the effects of 2008-09 financial crisis on the competitiveness of Italian provinces. Sustainable recovery? Rebalancing, Growth, and the Space Economy. Proceedings of the Winter Conference of Regional Studies Association, November 27-28, London, UK, 193-199.

Paskaleva, K. (2014). The smart city: A nexus for open innovation? In M. Deakin (Ed.), Smart Cities. Governing, modelling and analysing the transition. New York, USA: Routledge. ISBN: 9780415658195.

Pereira Roders, A., & Von Oers, R. (2011). Editorial: Initiating cultural heritage research to increase Europe's competitiveness. Journal of Cultural Heritage Management and Sustainable Development, 1(2), 84–95. DOI: 10.1108/20441261111171657.

Porter, M.E. (1996) Competitive advantage, agglomeration economies and regional policy. International Regional Science Review, 19(1-2), 85-90. DOI: 10.1177/016001769601900208.

Tuscany Region. (2011a). Development Regional Plan 2011-2015. Florence, IT: Tuscany Region. Available at: http://www.regione.toscana.it/documents/10180/71334/PRS%20Programma%20Regionale%20di%20Sviluppo%202011%202015/c956481a-01a4-47fd-8112-a912075c180f.

Tuscany Region. (2011b). Promozione e progettazione dei Distretti tecnologici. Documento operativo. Florence, IT: Tuscany Region. Available at: http://www.toscanaeconomia.it/UserFiles/File/Promozione%20e%20progettazione%20Distretti%20Tecnologici.pdf.

Wolfram, M. (2012). Deconstructing Smart Cities: An Intertextual Reading of Concepts and Practices for Integrated Urban and ICT Development. Proceedings of the 17th International Conference on Urban Planning, Regional Development and Information Society, May 14-16, Schewechat, Austria, 171-181. ISBN: 978-3-9503110-3-7.

Schuuman, D., Baccarne, B., de Marez, L., & Mechant, P. (2012). Smart Ideas for Smart Cities: Investigating Crowdsourcing for Generating and Selecting Ideas for ICT Innovation in a City Context. Journal of Theoretical and Applied Electronic Commerce Research, 7 (3), 49-62. DOI: 10.4067/S0718-18762012000300006.

Sinkiene, J., Grumadaite, K., & Liugailaite-Radzvickiene, L. (2014). Diversity of theoretical approaches to the concept of smart city. Proceedings of the 8th International Scientific Conference "Business and Management 2014", May 15-16, Vilnius, Lithuania, 933-940. DOI: 10.3846/bm.2014.112.Berdini, P. (2008). La città in vendita. Roma: Donzelli.

IMAGE SOURCES

Cover image: http://www.pescini.com/cms/wp-content/uploads/2015/06/firenze_duomo.jpg
Fig. 1, 2: elaborated by the authors
Fig. 3: D'Amico, Del Bimbo and Ercoli, 2014

AUTHORS' PROFILES

Carmela Gargiulo

Associate professor of Urban Planning Techniques at the University of Naples Federico II. Since 1987 she has been involved in studies on the management of urban and territorial transformations. Since 2004, she has been Member of the Researcher Doctorate in Hydraulic, Transport and Territorial Systems Engineering of the University of Naples "Federico II".

She is Member of the Committee of the Civil, Architectural and Environmental Engineering Department of the University of Naples "Federico II". Her research interests focus on the processes of urban requalification, on relationships between urban transformations and mobility, and on the estate exploitation produced by urban transformations. On these subjects she has co-ordinated research teams within National Project such as Progetto Finalizzato Edilizia – Sottoprogetto "Processi e procedure" (Targeted Project on Building – Subproject "Processes and procedures), from 1992 to 1994; Progetto Strategico Aree Metropolitane e Ambiente, (Strategic Project Metropolitan Areas and Environment) from 1994 to 1995; PRIN project on the "Impacts of mobility policies on urban transformability, environment and property market" from 2011 to 2013. Scientific Responsible of the Project Smart Energy Master for the energy management of territory financed by PON 04A2_00120 R&C Axis II, from 2012 to 2015. She is author of more than 90 publications.

Maria Rosa Tremiterra

Engineer, 2nd (level) University Master degree in Municipal Planning at University of Naples Federico II. She received a master's degree in Architecture and Building Engineering with a thesis on sustainable mobility in the European cities. In

Department of Civil Engineering, Building and Environmental Engineering, University of Naples Federico II.