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Articoli e saggi

The role of Sustainable Urban Mobility Plan instruments in the development of smart cities

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1. *Introduction*

This paper aims to examine the role of Public Administration in the development and the management of smart cities with particular reference to the theme of smart mobility.

Hence, it will analyse the role of Public Administration as a planner in the field of urban mobility. Specifically, the focus of the paper is represented by the Sustainable Urban Mobility Plan (SUMP), which is a strategic plan oriented to the development of smart and sustainable mobility among cities. With regard to this theme, it is important to question its specific role and functions and also to understand its relations with other urban planning instruments.

As for the methodology followed for the elaboration of the paper, the point of view adopted is the Public Administration's one, in order to comprehend its effective role in the management of smart cities and to understand if there is a necessity to develop new mobility planning instruments. In addition to that, critically, the essay aims to reflect on the ability of the Public Administration to deal with the new needs arisen due to the development of smart cities. Indeed it will

be highlighted that new figures and competences are required in the public sector with particular reference to the field of smart cities.

With these purposes fixed, the paper, starting with a brief presentation of the concept of smart city, will go through the European Union framework related to smart mobility. Then, it will focus on the Sustainable Urban Mobility Plan with attention to its structure, role and effects. Within the smart mobility theme, the paper will also analyse the impact of emerging Artificial Intelligence (AI) technologies in the field of mobility and urban planning. To this regard, it is fundamental to investigate if the regulation of those technologies can be included within the SUMP.

In the last pages, adopting a "case study" methodology, the essay will examine some European virtuous examples of mobility planning.

2. *The development of smart cities in the European framework*

During the last few years the term «smart» has started to be used in relation to cities and urban contexts. Indeed, we have observed a lot of urban transformation experiences[1], also thanks to the development of Information and Communication Technologies (ICT). So, the concept of «smart city» has taken a primary position in the public debate, both on a national and a European (even global) scale.

According to the definition given by a research of the University of Wien and developed in the occasion of a project aimed to set up a ranking of medium-sized cities[2], a smart city «is a city well performing in a forward-looking way in six characteristics (smart economy, smart people, smart governance, smart mobility, smart environment, smart living), built on the "smart" combination of endowments and activities of self-decisive, independent and aware citizens»[3]. This definition shows how the concept of smart city involves a lot of different aspects and implies a lot of reflections in different areas, including the political and juridical one.

[1] For a deeper analysis on urban transformations consult E. Carloni, M.V. Pineiro, *Le città intelligenti e l'Europa. Tendenze di fondo e nuove strategie di sviluppo urbano*, in *Ist. Fed.*, 2015, 865.

[2] The definition was elaborated during a research project aimed to analyse the effects that globalization, liberalization measures and fast technological changes had on cities development. This research was also oriented to set a ranking of medium-sized cities in the European context. In particular, researchers focused on the definition of «smart city», which at the time of the project (2007) was not a very widely used term in the context of urban research or planning literature. In order to develop that definition and to identify the main characteristics of smart cities, authors referred to the different fields among which smart cities used to be described (such as participation, industry, infrastructure).

[3] R. Giffinger, C. Fertner, H. Kramar, R. Kalasek, N. Pichler, Milanovic, E. Meijers, *Smart cities. Ranking of European medium-sized cities*, Wien, University of Technology, 2007.

The importance of smart cities theme is demonstrated by the attention given to them by the Institutions of the European Union[4], which have been promoting different integrated politics oriented to a sustainable and inclusive cities development[5].

The European Commission has also provided a definition of smart cities, which are described as «places where traditional networks and services are made more efficient with the use of digital solutions for the benefit of its inhabitants and business»[6].

The increasing importance of urban politics at the European level has been demonstrated with the adoption of the Urban Agenda for the EU[7], which is aimed to improve the quality of life in urban areas, involving Urban Authorities[8] in order to achieve better regulation, better funding and better knowledge. This document is absolutely coherent with the purposes of the United Nations 2030 Agenda for Sustainable Development, which, among the seventeen established goals, refers also to the necessity to improve urbanization and urban planning, in order to ensure inclusive, safe, resilient and sustainable cities[9].

The Urban Agenda of the EU has been renewed and implemented in 2021[10], as a demonstration of the unvaried interest of the European Union for urban matters. In that way, EU Member States Ministers provided for a new frame-

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[4] According to E. Carloni, M. V. Pineiro, *Le città intelligenti e l'Europa.* cit., 878, indeed «riflettere sulla città del futuro diventa, per l'Unione, un'esigenza naturale che si accresce all'accrescersi del suo ruolo».

[5] During the 2007 EU Member States, represented by Ministers responsible for urban development, adopted the Leizpig Charter on Sustainable European Cities in order to encourage integrated urban politics. Then, in 2010, Member States adopted the Toledo Declaration on addressing the current urban challenges and implementing the Europe 2020 strategy by achieving a smarter, more sustainable and socially inclusive urban development. Another significant document is represented by the *City of Tomorrow. Challenges, visions, ways forward* of 2011, which affirmed that «looking ahead and developing visions of the cities of tomorrow is becoming increasingly important at all levels. The development of our cities will determine the future of Europe». Lastly, with the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of Region on European Missions, COM(2021) 609 final, of the Sept. 9, 2021 the Commission included, among other missions, the *100 Climate-Neutral and Smart Cities by 2030*, highlighting that «producing more than 70% of global CO2 emissions, cities play a pivotal role in achieving climate neutrality by 2050».

[6] The definition is localized in the official website of the European Commission of EU at the following link: https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban development/city-initiatives/smart-cities_en.

[7] The Urban Agenda for the EU, better known as the Pact of Amsterdam, has been adopted on May, 30 2016 with an agreement among EU Ministers responsible for urban matters.

[8] As clarified by the Agenda itself, the term «Urban Authorities» is used to address the relevant public authorities responsible for the governance of the aforementioned «"Urban Areas", be it local, regional, metropolitan and/or national authorities».

[9] The reference is to goal nr. 11 which is titled «Make cities and human settlements inclusive, safe, resilient and sustainable».

[10] On November 26, 2021, EU Ministers responsible for Urban Matters adopted the Ljubljana Agreement and its Multiannual Working Programme that materialise the start of a new phase of the Urban Agenda for the EU.

work for the planning, implementation and monitoring of the Urban Agenda of the EU, with the aim of also encouraging the participation of small and medium-sized urban authorities.

So far it is clear that smart cities represent a new paradigm for urban development, a new way of identifying and shaping urban contexts[11]. That implies the necessity to critically investigate the role of National Public Administrations, as important actors in this process of transformation and development. Indeed, even if private actors cover a fundamental role in the smart development of urban context, the public power can intervene in a lot of different modalities[12].

In this regard, it is important to mention the two different existing approaches on the theme: American and European[13]. The American model is based on a bottom-up idea of innovation, which implies a substantial retraction of public powers, according to the logic of the enabling State. In that context, public authorities are only entitled to promote a favourable institutional and regulatory framework in a perspective of simplification. At the opposite, the European model is based on an active role of public powers, which are designated not only to provide for public fundings, but also to identify the best measures to be adopted, according to a top-down idea of innovation. Some scholars have expressed their preference for this second approach, highlighting the necessity of a public intervention and limits of a deregulatory model[14].

In that way, Public Administrations assume a key role in smart urban development[15]. Indeed, first of all, they have to provide for appropriate strategic planning, with an implementation of multilevel politics and governance, and, secondly, they have to address public spending towards the realization of smart, innovative and sustainable instruments. Obviously, the implementation of smart

[11] On this point, F. Gaspari, *Città intelligenti e intervento pubblico*, in *Dir. economia.* 2019, 71 ss., which affirms that «il concetto di smart city non può essere limitato soltanto alla digitalizzazione o legato solo alle problematiche ambientali. Tale concetto implica una vera e propria rivoluzione di come concepire il rapporto tra uomo, ambiente/territorio e intelligenza artificiale/automazione».

[12] In this regard, F. Fracchia, P. Pantalone, *Smart city: condividere per innovare (e con il rischio di escludere?)*, in *Federalismi.it*, 2015 underlined that, in addition to the legislation, public powers have the planning function. They can also introduce rules in order to orient public commissions and use mechanisms aimed to encourage virtuous behaviours.

[13] The difference between the two models is described by E. Ferrero, *Le smart cities nell'ordinamento giuridico*, in *Foro Amm.*, 2015, 1267.

[14] In that sense, F. Gaspari, *Città intelligenti e intervento pubblico,* cit., 84 sustains that the mere predisposition of guidelines and recommendation is not sufficient in urban development process.

[15] With reference to the Italian context, city planning represents an administrative function (for a deeper analysis of the concept of city planning, consult A. Bartolini, *Urbanistica*, in *Enc. dir.*, Tematici, Milano, 2022, 1260.

cities could imply a rethinking of urban planning and government of territory, with the definition of new planning instruments aims[16].

3. *The concept of smart mobility*

As already seen, smart cities represent a multidimensional phenomenon which involves different matters and multiple competence spheres. Among these spheres, mobility represents one of the main aspects related to smart cities. Indeed, even the definition of smart city given by the University of Wien in 2007 included smart mobility among the six main characteristics of smart cities.

Specifically, the concept of smart mobility is closely related to the idea of sustainable mobility, which represents a fundamental value of the current historical moment, in which the constant increasing demand of urban mobility has determined a detriment of citizens' quality of life. In this regard it is important to underline that the concept of sustainable mobility does not refer only to the environmental dimension. In fact the notion of sustainable development is based on three different pillars: economic development, social development and environmental protection[17].

The most important milestone in the field of mobility planning at EU level is represented by the Urban Mobility Package of 2013[18], where the European Commission, in the Annex, provided for the definition of the concept of Sustainable Urban Mobility Plan.

Furthermore, the relevance of mobility in the context of (smart) cities has been highlighted by the EIT Urban Mobility[19], which affirms that «transportation determines how cities look like, how liveable, equitable and healthy they are»[20].

Present European Union politics highlight the necessity to put mobility at the centre of the planning of future smart cities. At this regard, with a Communication of 2020[21], the EU Commission, underlining the fact that «mobility and

[16] As an example, the Italian Consiglio di Stato, with the sentence n. 2710 of May 10, 2012, affirmed that the public power of planning is not only oriented to the building development of the land, but it is also aimed to the realisation of various public constitutional interests.

[17] The reference is to the Johannesburg Declaration on Sustainable Development adopted by the World Summit on Sustainable Development on September 4, 2002.

[18] COM(2013) 913.

[19] EIT Urban Mobility is an initiative of the European Institute of Innovation and Technology created in 2019 and aimed take actions in order to transform urban mobility.

[20] EIT Urban Mobility, *New EU Urban Mobility Framework to spur transition to safer and more sustainable urban mobility*, Dec. 14, 2021, in *www.eiturbanmobility.eu* (https://www.eiturbanmobility.eu/new-eu-urban-mobility-framework-to-spur-transition-to-safer-and-more-sustainable-urban-mobility/).

[21] *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Sustainable and Smart Mobility Strategy – putting*

transport matters to us all», affirmed that future innovations in the mobility field implicate the necessity to establish a proper framework which can facilitate the transition to a much more efficient, smart and sustainable transport system.

In addition to that document, a New EU Urban Mobility framework has been adopted in 2021[22]. In this document the Commission, completely conscious about the fact that mobility is a critical aspect of social inclusion and about the consequences of Covid-19 on mobility and transports[23], pointed out the necessity of emerging «from the crisis with a more resilient, smarter and more sustainable urban mobility system».

From Public Administrations perspective, both these documents underlined the necessity of significant actions and investments not only at an European level, but also at a National and local one. They also pointed out the lack of significant collection of urban mobility data and of the uptake of SUMP. In addition to that, coherently with the top-down model, they observed the necessity of a more relevant support from local authorities and of a better urban planning.

4. *The necessity to improve Public Administrations knowledge for smart cities development*

As highlighted in the previous paragraphs, the development of smart cities requires an active role of Public Administrations. Indeed, according to the European top-down vision of innovation, public authorities are called to adopt concrete measures in order to develop smart cities and to not leave this process to private actors only. Having established that, it is fundamental to question if national administrations are capable of assuming this role.

In order to answer this question scholars have underlined the necessity to enhance and improve knowledge skills of internal experts of Public Administrations[24]. In this sense, even the Italian National Recovery and Resilience Plan (PNRR) is focused on the improvement of administrative capacity. Indeed, one

European transport on track for the future, COM(2020) 789, Brussels, Dec. 9, 2020 (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789).

[22] Communication from the Commission *to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: The EU New Urban Mobility Framework, COM (2021) 811, Brussels, Dec. 14, 2021* (https://transport.ec.europa.eu/system/files/2021-12/com_2021_811_the-new-eu-urban-mobility.pdf).

[23] As highlighted by sector's experts, Covid-19 has been having a disruptive impact on mobility and on the relation between citizens and public space (on that theme G. Gallitano, M. Leone, F. Lotta, *Accessibilità post-pandemia: riflessioni sullo spazio pubblico,* in *Rivista*, 2020, 242).

[24] In particular, C. Lauri underlines that «public power is at crossroads. On the one hand, there may be a total shift towards forms of privatisation, as private actors appear armed with a kind of algorithmic objectivity […]. On the other hand, economy and social sciences reveal an effort to push public powers to not abdicate

of the main challenges of the PNRR is to enhance the role of Public Administrations through digitalization, simplification and the improvement of human skills. In particular, the first mission of the Plan focuses both on the digitalization of the Public Administration and on the preparatory measures for successive reforms. Among these measures, the Plan concentrates its attention on the development of new competences and skills for the employees of PA and on the simplification of procedures[25]. The adoption of these kind of measures is vital, especially considering that in Italy the average age of public workers is fifty years and that almost 17% of them is over sixty[26]. In addition to that resources destinated to staff formation have decreased over the years and only a small part of PA employees have digital and management competences[27].

The development of smart cities involves a lot of different fields of competencies, but in the majority of situations, they do not belong to the internal staff of Public Administrations, both on a national and on a local level. This is particularly evident in the field of smart (and sustainable) mobility in which many areas of specific and technical knowledge are involved. Indeed, currently, mobility planning also involves the arrangement of digital platforms and consideration and comparison with economic, social and environmental necessities. So, not only new competences, but also new forms of planning and legal instruments are required.

In this regard, in Italy, a new figure has been introduced by the legislation in order to specifically manage mobility issues, which, as we have seen, represent one of the main aspects for the development of smart cities. That figure corresponds to the mobility manager, already introduced by legislation in 1998, but recently improved in 2020 in parallel with the strengthening of the SUMP[28]. With specific reference to the mobility manager of local authorities the legislation states that they have to nominate the figure among the staff on payroll. That imposes some observations. Indeed, fixed that public staff formation is a problem in the Italian context, it becomes natural to demand if all the administrations are equipped with persons qualified for this role considering the specific functions to which they are destinated, including the drafting of the home-office movement plan. In fact, transfiguration of mobility services in urban contexts, due to smart

their role in guiding innovation paths, as they result called to guide shared strategies and policies more than ever» (C. Lauri, *Expert Knowledge and Smart City Administration*, in *Erdal*, 2021, 57-76).

[25] The reference is to the Component 1 of Mission 1 of PNRR.

[26] Data are taken from the FPA, *Annual Report 2021*, FORUM PA, Roma, 2022. which specifies that people over sixty years represent the 16,3% and people under 30 only the 4,2%.

[27] Public investment for staff formation corresponds to 1.2 days of formation in a year (FPA, *Annual Report 2021*, FORUM PA, Roma, 2022).

[28] Art. 229 of Decree-Law of May 19, 2020 n. 34 imposes that companies and Public Administration with more than 100 employees located in municipalities with over than 50.000 inhabitants or in a metropolitan city or in provincial/regional capital city have to nominate a mobility manager in order to adopt a plan related to home-work movements.

approach, implies the employment of new competences in order to realize a really efficient service and we do not have to take for granted that all local administrations can count on that kind of specialists. For these reason, it would be recommended for the administration to provide for specific formation courses both for mobility managers and the staff.

5. *The Sustainable Urban Mobility plan: structure, role and effects*

The transformation of urban contexts into smart cities requires proper forms of planning[29]. This is particularly evident also in the field of mobility. On these grounds, beside traditional planning instruments, new ones have been introduced.

In particular, in 2013 the European Commission, after a broad dialogue with planning specialists, set out a concept for the development of a Sustainable Urban Mobility Plan, which could be adapted in the singular Member State contexts[30]. In particular, it affirmed that this type of plan is characterized by a long term vision for the future development of transport and mobility in urban areas.

The importance assumed by the Sustainable Urban Mobility Plan has increased during the years. In this perspective, the European Commission is planning to strengthen its role, also by publishing by the end of the current year a recommendation to Member States.

For this reason, from a legal point of view, it is fundamental to investigate structure, functions and effects of this plan and also the role which has to be undertaken by Public Administrations in the development and the management of urban mobility and transport, as vital aspects of smart cities. Furthermore, it is necessary to scrutinize its relations with traditional instruments of planning, in order to understand if we are living a change of paradigm in the field of urban planning.

ELTIS guidelines[31] provided a definition of Sustainable Urban Mobility Plan, affirming that «it is a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life.

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[29] See D. Santiago Iglesias, *From Smart Cities to Smart Communities: a Conceptual Approach*, in *Erdal*, 2021, 33-45, in which the author affirms that «Providing ad improved quality of life through smart communities requires proper advance planning».

[30] The reference is to the annex *A concept for Sustainable Urban Mobility Plans* to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions *Together towards competitive and resource-efficient urban mobility*.

[31] The reference is to the second edition of these guidelines, *Guidelines for developing and implementing a Sustainable Urban Mobility Plan*, second edition, reachable on ELTIS (European Local Transport Information Service) official website (https://www.eltis.org/mobility-plans/sump-guidelines).

It builds on existing planning practices and takes due consideration of integration[32], participation, and evaluation principles».

As for the first characteristic, the strategic nature of the Sustainable Urban Mobility Plan implies that its contents essentially have the function to address planning choices in the theme of mobility and transport. However, it does not mean that a Sustainable Urban Mobility Plan cannot determine compulsory effects. Indeed local entities are called on to realize the targets established in a SUMP in their own instruments of city planning[33].

As an example of the mandatory effects of a Sustainable Urban Mobility Plan, it is possible to cite the SUMP related to the metropolitan city of Bologna, in Italy. In fact, in its general report, the Council of the city states that the dispositions included within the Sustainable Urban Mobility Plan have its own juridical effectivity and obligate municipalities and other territorial entities to respect its contents. In that way, these territorial administrations could ensure a rational, coherent and logical implementation and application of Sustainable Urban Mobility Plan dispositions in their planning instruments[34].

These plans, being an example of strategic planning, obviously do not provide for specific and focused actions for urban mobility. Indeed these actions are delegated to successive phases of planning. Nevertheless, as we have seen before, their role is fundamental in order to condition territorial planning activities through fixing objectives and priorities.

As highlighted by the same ELTIS guidelines, this type of plan is different from traditional transport planning for other reasons. With regard to the related area, it does not deal with a specific administrative area, but it covers a functional urban area on the basis of travel-to-work flows[35]. In addition to that, a Sustainable Urban Mobility Plan provides for a long-term vision and strategy instead of being a short and medium-term delivery plan.

Furthermore, a significant difference with traditional ways of planning is represented by the path followed for its elaboration. Indeed, the plan is not drafted only by experts, but it involves stakeholders and citizens thanks to a transparent and participatory approach. In that way the Sustainable Urban Mobility Plan emphasizes

[32] Principle of integration is mentioned both in the Rio Declaration on Environment and Development of June 14, 1992 and in the article 11 of the Treaty of Functioning of the European Union.

[33] In this sense T. Bonetti, *Il trasporto pubblico locale nel prisma della mobilità sostenibile*, in *Dir. Amm.*, 2020, 563.

[34] Deliberation of the Metropolitan Council of the city of Bologna n. 54 of Nov. 27, 2019, which approved the SUMP for the metropolitan city of Bologna (Italy).

[35] The definition of a functional urban area, as agreed by OECD, Eurostat and its Directorate General for Regional and Urban Policy, it is grounded on «population density to identify urban cores, and on travel-to-work flows to identify the hinterlands whose labour market is highly integrated with the cores» (OECD, *Definition of Functional Urban Areas (FUA) for the OECD metropolitan database,* 2013, 2. www.oecd.org/cfe/regional-policy/Definition-ofFunctional-Urban-Areas-for-the-OECD-metropolitan-database.pdf).

the necessity to meet the mobility needs of people, institutions and companies with interests (as workers, residents or visitors) within the functional urban area.

This participatory approach is not a constant in the field of urban planning. Focusing on the Italian context, the fundamental law on administrative procedures states that general rules on participation do not find application in the field of planning[36]. To this regard, as underlined by ELTIS guidelines, «the consultation and involvement of stakeholders within and outside government, including civil society and private industry, increases support for mobility actions»[37]. In that way the likelihood of success of a Sustainable Urban Mobility Plan is certainly increased.

For what specifically regards the itinerary of development and approval of the Sustainable Urban Mobility Plan, the cited Guidelines explain that it is a complex procedure composed of four main different steps[38].

The first step is represented by the decision of the policy makers to draw up the plan. In this phase the analysis of the planning context is an essential activity that Administrations have to conduct, eventually with the collaboration of external experts.

With the second phase competent authorities have to define the strategic direction of the plan. This is the stage in which the participation of citizens and stakeholders is more important, in order to elaborate a shared view of mobility for the future. Obviously it is essential to fix some targets and indicators to monitor progress.

The operational level starts with the third step, during the which planners have to delineate concrete measures to be adopted.

Finally, the fourth phase is oriented on the implementation of the undertaken measures and on their monitoring and their evaluation. This step is also essential for the possible modification of the future strategy on the basis of experienced successes and failures.

These steps compose a complex procedure of planning which implies the participation of numerous actors and the evaluation of a lot of different interests which have to be integrated. This indicates a new shape of Public Administrations in their role of urban planners. Indeed, for example, referring to the dimension of planning, Administrations do not have to be strictly related with their

[36] In particular, article 13 (*Norme sulle partecipazione*) of the law n. 241 of 1990 (fundamental law on administrative procedure) affirms that «Le disposizioni contenute nel presente capo non si applicano nei confronti dell'attività della pubblica amministrazione diretta alla emanazione di atti normativi, amministrativi generali, di pianificazione e di programmazione, per i quali restano ferme le particolari norme che ne regolano la formazione».

[37] ELTIS guidelines, cit., 16.

[38] These steps are described in detailed in the ELTIS guidelines.

political boundaries. At the contrary they have to deal with new concepts such as the functional urban area.

Lastly, dealing with the theme of relations with traditional urban planning instruments, it is fundamental that mobility planning is integrated and shared with the other existing planning forms[39].

6. *AI technologies and their impact on smart mobility: the example of connected and automated vehicles*

"Today, more than ever, we all need better walking and cycling conditions, effective public and shared transport, multimodal nodes, and more – all supported by smart digital solutions". These are the words used by the Director-General of DG Move of the European Commission in the introduction to the Guidelines for developing and implementing a Sustainable Urban Mobility Plan.

They reveal the consciousness that in the current era smart digital solutions cover a fundamental position in a lot of different fields, including mobility and transport. In particular, with regard to these fields, Artificial Intelligence (AI) technologies have been implemented in order to develop connected and automated vehicles (CAVs). Obviously, it is clear that this kind of technology could have a great impact on the idea of mobility[40].

CAVs are vehicles equipped with a particular software able to receive and transmit data from the external environment, infrastructures and other vehicles through cameras, sensors and other technologies[41]. In that way the software has the possibility to replace, partially or completely, human drivers. Consequently the figure of the driver will be replaced by the figure of the vehicle's user (with much more freedom and flexibility).

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[39] In this sense, I. Abate Daga, *Relazioni tra Pums, Pianificazione Strategica e Piano Territoriale Generale*, in *Urbanistica e Informazioni*, 2019, 20.

[40] The Polis policy paper on *Road Vehicle Automation and Cities and Regions* (POLIS 2018) shows a general outlook of the main impacts that could possibly descend from the application of CAVs. In addition to that the ERTRAC Working group in 2017 developed an "*Automated Driving Roadmap*", in which gives a general overview of the possible applications of CAVs (https://www.ertrac.org/uploads/documentsearch/id48/ERTRAC_Automated_Driving_2017.pdf) .

[41] This is the definition contained in R. Lobianco, *Trasporto di persone e assetto giuridico della nuova mobilità urbana,* Milano, 2022. In particular the author recalled the differentiation among five levels of automation. This classification is presented also in C. Ingratoci, *Autonomous vehicles in smart roads: an integrated management system for road circulation*, in *Dir. trasporti,* 2020, 501. In particular, according to the US National Highway Transport Safety Administration (NHTSA), level 1 corresponds to solutions for driver assistance, level 2 to partial automation, level 3 deals with conditional automation, level 4 corresponds to high automation and level 5 indicates a full automation for all driving modes.

At this regard, it is evident that there is the necessity to regulate the application of these technologies, in order to avoid an amplification of urban mobility problems. This is the reason why a recent document of the European Commission affirms that «the success of the transition towards CAVs will largely be determined by introducing this new driving technology into the existing sustainable urban mobility planning processes of a city»[42]. In particular, the document is aimed to provide a recommendation on the way in which the principles of the Sustainable Urban Mobility Plan can be applied in the new framework of connected and automated vehicles. In this sense, always dealing with a top-down vision, the European Commission affirmed the necessity that local authorities take a leading role through a proactive planning approach[43].

Thanks to the funding of the Horizon 2020 programme, a programme[44] has been developed to support local authorities to deal with CAVs. Specifically, in a context of uncertainty, the programme underlined the necessity to develop an automation-ready framework.

At this point, it is evident that AI technologies had and will continue to have a disruptive impact on smart cities. As a consequence they have to be taken in consideration among the principles of strategic planning.

In particular, in the field of mobility and transports, the Sustainable Urban Mobility Plan can also be used to regulate the use of CAVs with a smart and sustainable perspective.

As observed by the cited document promoted by the European Commission, local authorities have to find a way to facilitate participation and dialogue with citizens and stakeholders on this complex and uncertain theme of CAVs[45]. Specifically, this could be possible only by implementing the knowledge around that topic.

In addition, seeing as though that the complexity of the topic implies that the mobility system cannot be developed and planned only by transport authorities, there is probably the necessity to re-assess competences of public transport authorities.

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[42] W. Backhaus, S. Rupprecht, D. Franco, *Road Vehicle automation in sustainable urban mobility planning*, European Platform on Sustainable Mobility Plans, 2019.

[43] In particular, in the introduction of the document, it is affirmed hat «this begins with planning for the introduction of CAVs as early as possible, to minimise the potential negative impacts and more importantly make the most of the opportunity to influence the paradigm shift into a more sustainable urban mobility vision».

[44] The reference is to the CoExist programme, an European project (05/2017 – 04/2020) aimed to prepare the transition phase in which traditional vehicles and CAVs will coexist in roads.

[45] Indeed «municipalities alone cannot solve mobility challenges and thus need to collaborate with mobility service and technology providers from the private sector» (W. Backhaus, S. Rupprecht, D. Franco, *Road Vehicle automation,* cit., 13).

Obviously in order to incorporate CAVs into the Sustainable Urban Mobility Plan processes an explicit decision by the competent authorities is required. That is the only way to try to guarantee a successful application of these new technologies.

7. *A "case study" approach: European virtuous examples of mobility planning*

The importance of the Sustainable Urban Mobility Plan, as an example of strategic planning, in the path towards the development of smart cities is demonstrated by different cities across the European Union.

For example it is possible to cite the experience of the city of Valencia in Spain. Indeed the city is striving in order to be the first fully integrated smart city of its country.

Furthermore Valencia is a great example also with regard to the theme of the disruptive impact of news technologies in the field on mobility and urban planning. Actually the utilisation of data and smart technologies has represented an essential aspect of the Sustainable Urban Mobility Plan. In this sense, since 2013[46], the city strongly supports the use of data and smart technologies[47], which have become a fundamental part of the plan.

Another virtuous example of Sustainable Urban Mobility Plan is represented by the plan of the metropolitan city of Bologna, in Italy. In particular, this plan exemplifies a great cooperation among different levels of government. Indeed the basis for the elaboration process of the Sump is the creation of a unique system for the technical and the political coordination between the Metropolitan city and the Municipality of Bologna[48]. Furthermore this plan is a well done application of the principle of integration. In fact, it is based, with regard to strategic addresses, on the *Piano Strategico Metropolitano* and it also represents the infrastructural component of the "Piano Territoriale Metropolitano". In addition to that, inside this plan, authorities also edited a metropolitan plan for cycling (*Biciplan*). Lastly the plan has been coordinated with the urban traffic plan (*Piano Generale del Traffico Urbano del Comune di Bologna*). In that way the Sump has underlined the importance of the integrated approach among urban, infrastruc-

[46] In that year the city adopted its first SUMP.

[47] As reported in the website of the Urban Mobility Observatory (H. Figg, *Valencia using smart city solutions to deliver on its SUMP*, in *www.eltis.org*, 2021 (https://www.eltis.org/resources/case-studies/valencia-using-smart-city-solutions-deliver-its-sump), «the city has been continuously developing its comprehensive municipal system of intelligent traffic monitoring and management ever since the launch of the SUMP in 2013».

[48] In addition to that, as reported by S. Bertoni, C. Chiusaroli, C. Carlini, L. Dell'Erba, A. Delpiano, G. Sgubbi, *Pums di Bologna: contenuti e prime risultanze*, in *Urbanistica e informazioni*, 2019, 26, a central role was played also by the partecipation of citizens and stakeholders and by the constant comparison with the Union of seven different municipalities of the territory.

tural and services development and of the synergy between various programmatic and planning instruments.

Moreover the *Sustainable Urban Mobility Plan of Bologna* is a great exemplification of the support and encouragement of smart solutions and technology for mobility.

8. *Conclusions: new paradigm for urban planning in smart cities*

In the conclusion of this analysis, it is fundamental to reiterate the fact that there is the necessity to redesign the role of Public Administrations, in their function of urban planners. Indeed, in order to keep up with the continuous and frequent transformations in the field of technologies that involve smart cities, there is the necessity to have a *Smart Public Administration*, which could be the promotor of smart planning[49]. To reach this aim, as highlighted in the fourth paragraph, it is fundamental to start with an efficient staff formation, in order to have public employees equipped with digital and innovation competencies. Indeed, only in that way, Public Administration could seriously cover this role of guidance in the evolution of urban contexts.

In parallel, it is necessary to invest power and energies in the elaboration of acts of strategic planning, such as the *Sustainable Urban Mobility Plan*. Obviously, it is important to underline that also Governments, as political bodies, have the power to set the context and to create the conditions that could allow cities to adopt Sustainable Urban Mobility Plans. Indeed, they are entitled to set the legislation about transport and mobility, the regulatory framework in which administrations have to operate and allocate financing resources[50]. In order to do that the cooperation and the possibility to compare experiences among different States is vital.

In this sense, it has been affirmed (in relation to the Italian context) that the development of smart cities implies a rethinking process referring to the government of the territory. It could be possible through the redefinition of the *Piano Regolatore Generale* (PRG) which is the fundamental instrument that municipalities have in order to regulate the use of their territories[51]. This fundamental plan

[49] During an interview, Maurizio Carta affirmed that «oltre che di una Smart City, abbiamo bisogno di uno Smart Planning, cioè di una progettazione, di una pianificazione, di politiche che siano più intelligenti. Il che significa che devono diventare più "smart" anche la PA e i sistemi produttivi», S. Farsagli, *Smart city? Smart planning!* Intervista a Maurizio Carta, in *www.techeconomy2030.it*, 2017. (https://www.techeconomy2030.it/2017/03/17/smart-city-smart-planning-maurizio-carta/).

[50] In this sense A. May, S. Boheler, Baedeker, L. Delgado, T. Durlin, M. Enache, J.W. Van der Pas, *Appropriate national policy frameworks for sustainable urban mobility plans*, in *Eur. Transp. Res. Rev*., 2017, 1.

[51] This is the vision of F. Gaspari, *Città intelligenti e intervento pubblico*, cit., 87.

during the years, has already acquired new functions: it is also used by local entities to promote values such as environmental sustainability and social cohesion.

As a consequence, as we have seen referring to the Sustainable Urban Mobility Plan of Bologna, the importance of a multilevel and integrated governance in order to develop smart cities has increased going beyond administrative boundaries. Indeed, the importance of strategic planning is more and more evident, especially considering the new principle of the hierarchy of interests, at the expense of principle of hierarchy of plans[52]. In this context strategic planning has increased its importance with the objective of realizing urban development models even without traditional rigid dispositions[53], by implementing the participation of citizens and stakeholders.

So with regard to the presented feasible change of paradigm (or a paradigm shift following Thomas Kuhn's theory[54]) in the field of urban planning, it is possible to affirm that urban planning is living a period of change and transition. Indeed, new emerging needs (such as, among the others, the protection of the environment), interests and also technologies, show the unsuitableness of old planning instruments. In this sense cities are the main characters of this process of transition towards new planning methods, of which the Sustainable Urban Mobility Plan is a great example[55].

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[52] L. Barsotti, Governo del territorio e tutela dell'ambiente, Pisa, 2021 affirms that current framework of urban planning is characterized by the affirmation of new principles of interests predominance and multilevel governance at the detriment of hierarchy of plans.

[53] In this sense G. Delle Cave, *Comunità intelligenti, enti locali e mobilità sostenibile: le smart city al cospetto del potere pubblico*, in *Dir. economia*, 2021, 385 ss., affirms that «gli strumenti per la realizzazione delle comunità intelligenti sembrerebbero impattare notevolmente anche a livello di pianificazione territoriale, in particolare sulla "pianificazione strategica" intesa quale processo grazie al quale è possibile costruire una rete relazionale tra gli attori che rappresentano la società locale al fine di individuare le possibilità di sviluppo e di definire assieme gli obiettivi e le strategie di lungo periodo per la trasformazione della città e della società nel suo complesso. Ciò con il chiaro obiettivo della realizzazione di modelli di sviluppo urbano sostenibile a prescindere da rigide disposizioni regolatorie prescrittive o vincolistiche».

[54] The reference is to its masterpiece *The structure of Scientific Revolutions* (1962), in which he described how sciences change and advance due to essential shifts with relation to the basic principles and rules governing a determined topic or scientific field.

[55] Indeed it is the result of a lot of different considered interests. In this sense P. Stella Richter, V. Parisio, *La mobilité urbaine, compétences administratives et aménagement du territoire dans le système juridique italien*, in *Riv. giur. edilizia*, 2019, 477, which affirms that «au niveau européen, et national aussi, le plan de mobilité, qui doit favoriser un développement équilibré, est le résultat d'une coopération entre différents secteurs tels que les transports, la sécurité routière, l'aménagement du territoire les villes intelligentes, l'environnement, le développement économique, la santé, se déroulant à différents niveaux de l'organisation administrative de chaque Etat-ville».

Martina Sforna - Abstract

The development of smart cities implies some reflections on the role of Public Administrations

Referring to the theme of smart mobility – one of the main topics in smart city projects – it is necessary to question the types of legal instruments which can be used in order to promote and regulate its applications.
The paper aims to analyse which planning's instruments can be used to regulate smart cities and the disruptive impact of Artificial Intelligence innovations. It is also oriented to investigate the capacity of Public Administration to deal with new exigencies in mobility field.
The essay will examine the role, the function and the effects of the Sustainable Urban Mobility Plan (SUMP) highlighting participation of citizens during its elaboration procedure and focusing on the impact of AI technologies, considering all the new instruments developed to create smart mobility solutions.
In conclusion, the paper will examine various applications of Sustainable Urban Mobility Plans in European cities in order to define the effective role of Sumps smart cities' development.

Lo sviluppo delle smart cities implica lo svolgimento di alcune riflessioni sul ruolo delle Pubbliche Amministrazioni

In particolare, con riferimento alla mobilità intelligente, la quale rappresenta uno dei principali temi nei progetti volti allo sviluppo di *smart cities*, è necessario interrogarsi in merito agli strumenti giuridici che possono essere utilizzati per promuovere e regolare le sue applicazioni.
Il contributo mira, dunque, ad analizzare gli strumenti giuridici che possono essere impiegati nella pianificazione e regolazione delle città intelligenti e in relazione al dirompente impatto delle innovazioni connesse al campo dell'intelligenza artificiale. Si propone, inoltre, di indagare la capacità della Pubblica Amministrazione di gestire le nuove esigenze sorte nel settore della mobilità.
Saranno, quindi, esaminati il ruolo, la funzione e gli effetti del Piano Urbano della Mobilità Sostenibile (PUMS) con particolare attenzione al profilo della partecipazione nelle procedure di elaborazione del piano e all'impatto delle tecnologie di intelligenza artificiale, in considerazione dei nuovi sistemi sviluppati nel settore della mobilità.
In conclusione, saranno passati in rassegna alcuni virtuosi esempi di Piani Urbani della Mobilità Sostenibile elaborati nel contesto europeo con l'obiettivo di definirne al meglio il ruolo.