

# Tools and Technologies for Enhancing Public Engagement in Sustainable Urban Mobility Planning - The Case of Rethymno, Crete

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**Abstract** This paper deals with public participation in developing Sustainable Urban Mobility Plans (SUMPs) in Greece, provided that SUMP development procedures require a high level of public engagement in several stages. Its importance lies on the fact that although the European Commission has provided specific guidelines, imposing a distinct framework for public engagement in developing a SUMP, Greek practices and maturity in participatory planning in general and sustainable mobility planning in particular are lagging behind the common know-how and practice of other European member states. The study attempts to establish an integrated methodology that combines classical and ICT-enabled tools and approaches in order a higher public engagement level to be achieved. This methodology is implemented and tested in a specific case study, the city of Rethymno - Crete, Greece. More specifically, the proposed methodology incorporates traditional techniques for gathering commuting data from citizens and visitors (i.e. questionnaires, mini surveys, workshops and public meetings) as well as innovative ones (i.e. map-based questionnaires, inclusive web-based participatory tools), used for data collection on public opinions for future planning purposes. Emphasis is placed on the development of a web-based crowdsourcing tool as a key for gathering ideas and views on sustainable urban mobility issues. Additionally, particular emphasis is placed upon exploring barriers to participation as well as ways to eliminate such barriers

and support a more active engagement of citizens in sustainable mobility planning exercises in the Greek context.

**Keywords** smart city, participatory planning, sustainable urban mobility, Rethymno

## 1 Introduction

Rapid urbanization challenges in recent decades have triggered severe changes in cities worldwide. As a result, cities' structural and functional complexity tends to increase through time (Bakogiannis et.al. 2016; Tsiotas and Polyzos 2017); and due to, among others, urban sprawl, traffic congestion and environmental degradation are worsening (Lopez-Lambas 2010; Verani et.al. 2015). Such phenomena are also evident in European cities, where more than 75% of the European Union inhabitants are nowadays living in (Silva and Ribeiro 2009; Lopez-Lambas 2010; Verani and Pitsiava-Latinopoulou 2013). Moreover, these phenomena are coupled with an urbanization process that favors urban fragmentation between the various spaces "where people live and work" (Silva and Ribeiro 2009). As a result, traffic flows and car use are constantly increasing, due to the fact that most cities were developed in a way that provided more and more space for car-based mobility through appropriate structural reformations, giving precedence to large infrastructure deployment, mainly road openings through land expropriations, as these were suggested by common transport studies.

The European Union, in an effort to cope with unsustainable urban mobility trends and their severe environmental repercussions, has set, among others, *new policy directions for the transport sector* (Kehagia 2017). The primary goal behind these directions (White Paper 2011) is to enable cities' functioning with fewer cars and at lower speeds, serving thus a more socially comfortable and economically efficient vision for urban spaces (Beria and Grimaldi 2014; Bakogiannis et.al. 2015). In order to achieve the above stated goal, the concept of "Sustainable Urban Mobility" is arising, sketching new planning directions that are serving urban sustainability objectives; and setting urban mobility as a sector cross-cutting all three pillars of sustainable urban development (i.e. namely economic, social and environmental) (Trakatellis 2004; Andrikopoulou et al. 2007).

Contemporary priorities in the context of sustainable urban mobility developments are not limited to adjusting cities' profiles in terms of landscaping and beautification improvements, but mostly refer to influencing minds and citizens' attitudes in a way that promotes more responsible transport and mobility behaviour and alters the current car-dependency regime. In order to do so, participative approaches and citizens' engagement are of utmost importance, serving a twofold goal, namely to: integrate citizens' views and expectations into the planning process for developing city- and citizen-specific plans; and train citizens in more informed, mature and sensitive behaviour with regards to transportation and mobility as well as their implications with respect to the urban and natural environ-

ment aspects, in order the impact of their daily actions on cities' smooth functioning to be fully grasped.

This research paper explores the extent to which citizens' participation can be realized in the Greek cities. The city of Rethymno is used as a case study. Rethymno is a medium-sized coastal urban environment, located in the Region of Crete; and a city that is currently developing a *Sustainable Urban Mobility Plan* (SUMP). Development of this plan has taken into consideration the necessity for community engagement by establishing a methodological planning approach that integrates traditional and innovative, digitally-enabled tools for conducting citizens' involvement in the various stages of the SUMP planning process. Through this approach, research depicts the potential of community engagement in: enriching the ground of the planning effort (data acquisition concerning the current state of the city concerned) by use of innovative participation tools and approaches; saving time and financial resources that traditional planning processes would demand; and reaching more effective planning outcomes.

## 2 Implementing Innovative Participatory Tools in SUMP Projects

Sustainable Urban Mobility Plans are nowadays considered as important tools for transforming contemporary cities into more sustainable urban cores. As such, they have so far been adopted by many European cities (Sá and Gouveia 2011; Papaioannou et. al. 2016; Khreis et.al. 2017). A SUMP actually introduces a *new planning perception* in order a plan to be produced that aims at addressing transport- and mobility- related problems in a more sustainable way (Papaioannou et. al. 2016); and thus improving quality of life in contemporary cities by ensuring the functioning a reliable and effective, environmentally-friendly urban transport system (Okraszewska et. al. 2018). A key component of a SUMP is *public engagement* in all phases of its development in order a shared vision for the city by its citizens, stakeholders and decision makers to be produced.

The main differences between the planning processes resulting in a SUMP and those of traditional transportation planning are summarized in Table 1. As demonstrated by elements of Table 1 but also Fig. 1, depicting the planning process inherent in a SUMP production, this introduces a more "bottom-up" planning approach, setting *public participation* as a key component of its methodological cycle. As such, it should not only be confined to public consultation and opinion-raising for reaching consensus with respect to the outcome of the planning process, i.e. the plan for sustainable mobility (Kyriakidis 2012); but should also be expanded to other stages of the planning process as well. As such can be considered the: exploration of the *current state*, implying data collection from the local community for better grasping current state and inefficiencies of the transport and mobility pattern; and *policy design*, by engaging local community in assessing and prioritizing the policy measures concerned for a more effective implementation of SUMP (Somarakis and Stratigea 2014). In fact, according to the ELTIS guidelines

(2013), citizens' engagement should be incorporated in all four phases of a SUMP, i.e. the preparation stage, the goal setting stage, the stage of elaborating the sustainable mobility plan and the stage of implementing it (Fig. 1).

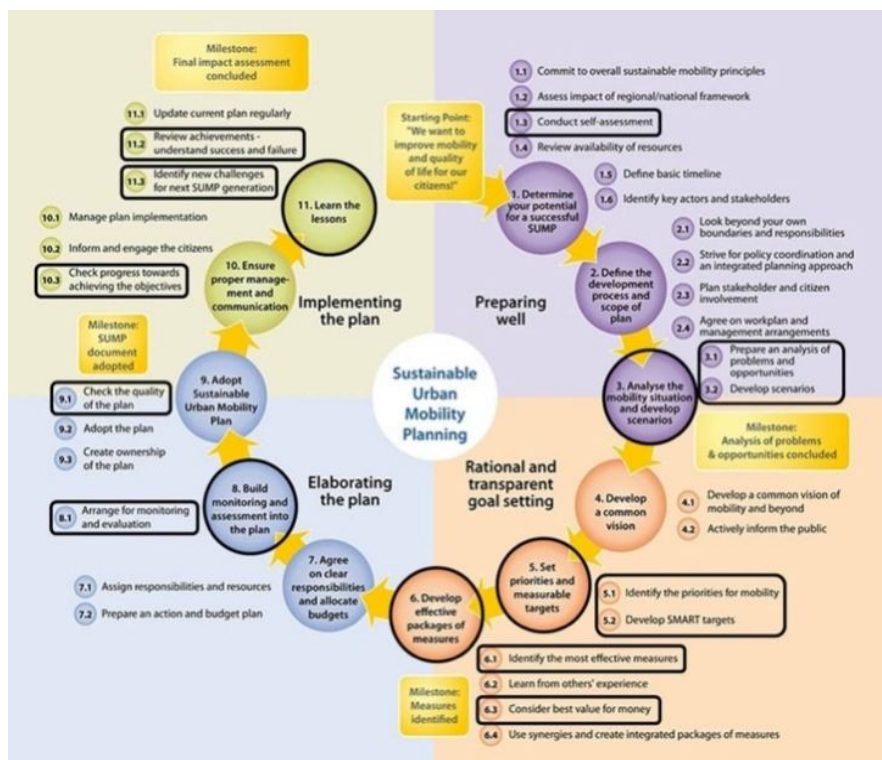
**Table 1** Differences between traditional transport planning and sustainable urban mobility planning (European Commission 2013)

Traditional Transport Planning	Sustainable Urban Mobility Planning
Focus on traffic	Focus on people
Primary objective; Traffic flow capacity and speed	Primary objectives; Accessibility and quality of life, as well as sustainability, economic viability, social equity, health and environmental quality
Modal-focused	Balanced development of all relevant transport modes and shift towards cleaner and more sustainable transport modes
Infrastructure focus	Integrated set of actions to achieve cost-effective solutions
Sectorial planning document	Sectorial planning document that is consistent and complementary to related policy areas (such as land use and spatial planning; social services; health; enforcement and policing; etc.)
Short- and medium-term delivery plan	Short- and medium-term delivery plan embedded in a long-term vision and strategy
Related to an administrative area	Related to a functioning area based on travel-to-work patterns
Domain of traffic engineers	Interdisciplinary planning teams
Planning by experts	Planning with the involvement of stakeholders using a transparent and participatory approach
Limited impact assessment	Regular monitoring and evaluation of impacts to inform a structured learning and improvement process

Indeed, it is crucial to grasp the potential role and position of stakeholders at the beginning of the planning process in order signs of potential conflicts and/or coalitions to be, early enough in the process, identified; and explore the ways these may affect the planning process and outcomes (Step 1.6 in Fig 1). In that way, more knowledgeable decisions can be made by practitioners with respect to the citizens' involvement process (Step 2.3); and the development of a common vision and ideal scenarios (Steps 4.1 and 4.2), by eventually directly engaging citizens in a vision building process. In case that the latter is not feasible (e.g. financial constraints, impeding extensive vision-building participatory processes), community and local stakeholders should at least be widely informed about this vision in order their awareness to be increased and the plan's broad acceptance to

be assured (Step 4.2). Identification of the most effective measures for effective implementation of SUMP can take into consideration others' experiences (Step 6.2); while properly adjusting them to local peculiarities and contextual elements. Of importance is also the assurance of a high quality SUMP proposal (Step 9.1) and its wide communication in order its ownership by local community to be increased (Step 9.3). At the stage of SUMP implementation, of crucial importance is Step 10.2, referring to the wide spread of information on the proposed measures and the motivation of local groups to engage and support their successful implementation; and Step 10.3, stressing the need for a steady monitoring of its progress for potentially undertaking corrective policy actions.

**Fig. 1** Steps of the planning process for SUMP development (ELTIS 2017)



In order to achieve a high level of public participation throughout the whole SUMP process, a range of *participation tools* can be adopted. Specific choices with regards to the participation tools to be used in this process need to be carefully done in alignment with the goal of participation at each stage concerned and relative tools' attributes, taking into consideration that different tools imply a diversified type and degree of public engagement (See et al. 2016), ranging from a

purely informative to a co-design/co-decide involvement (Stratigea 2015) in the final planning outcome, i.e. the SUMP.

Thus, engagement through conventional consultation procedures, where citizens can express mainly their objections or even their consent, can be further enriched by a range of either traditional tools, such as workshops and field trips (Kyriakidis 2012) or more contemporary ones, such as web applications, crowdsensing and crowdsourcing techniques, implemented mainly through mobile appliances like smartphones and pads (Bizjak 2012; Papadopoulou and Stratigea 2014).

Digitally-enabled participation has, during recent years, been financed the European Commission through a range of projects that promote *crowdsourcing* and attach to the people the role of “sensors” in urban management issues (Pödör et al. 2015). The aforementioned development, although in principle is part of the crowdsourcing process, it is better articulated through the concept of *crowdsensing*. The concept of crowdsensing refers to procedures related to the provision of information for the immediate, complete or partial-resolution of a problem by gathering information from a group of people or communities that act as 'sensors', and provide information intentionally or unintentionally, mainly through smart mobile phones (Ganti et al. 2011; Xiao et al. 2013). Indeed, in many recent projects across Europe, public contributes to the provision of information, usually through the usage of smartphones, without bearing any costs to the institutions/bodies that evaluate and analyze it (Schweizer et al. 2011). These projects are largely associated with the collection of environmental data as a result of the ratification of the Aarhus Convention (UNECE 1998); and its integration to the European legislation (Directive 2003/35 / EC), where the need for getting access to and engagement of the public in decision-making processes with an environmental footprint, is underlined.

Usage of such innovative tools contributes to the smartening up of urban environments, as witnessed by the analysis of smart cities' projects (Poslončec-Petrić et al. 2016), further enhancing public willingness to engage and actively participate in planning endeavors in order more knowledgeable and inclusive solutions to the various urban issues to be sought.

### **3 Current Practices in Crowdsourcing and Crowdsensing**

Gathering urban mobility experiences and good practices from the international scene can enrich the existing knowledge stock and lead to the development of optimal solutions in similar study fields. However, such experiences and practices have reference to different urban environments and related societal contexts. This implies the need for highlighting those elements that can be transferred to the specific case study environment and improve or properly adjust the proposed approaches. In cases of spatial or urban plans, such as the Sustainable Urban Mobility Plans, this practice can be proved particularly beneficial (Bakogiannis et al.

2014). However, particularities related to the local conditions and specific attributes should be thoroughly studied in order for a successful implementation to be ensured (Kyriakidis 2016).

This research endeavour explored several recently emerging good practices in the field of *urban mobility*, identified as successful within the international academic and professionals' community. More specifically, the applications and services analyzed included the following endeavours; SenseMyCity, CityMakers, Tell us Toolkit, CoUrbanize, QualiT, CitySensing, CrowdSenSim, Nexthamburg and SynAthina.

*SenseMyCity* is part of the Future Cities' project and aims at collecting geo-referenced data, emerging from various users who have sensors on their smartphones (Sa 2014). This system includes a number of sensors (Rodrigues et al. 2014) and collects data on acceleration, magnetic field, luminance, temperature, pressure, humidity, sound, position (gps), network presence, etc. Data processing and analysis are carried out by use of particular algorithms that allow outcomes regarding fuel consumption per trip, traffic identification and grouping of zones in terms of consumption levels, as well as grouping of zones in terms of drivers' stress levels. Additionally, such data analysis allows the optimization of the journey's route selection in terms of travel time and consumption levels. A specific feature allows the identification and grouping of people with similar travel preferences and the establishment of interaction among them, e.g. people searching for car-pooling in order to share travel costs or cyclists looking for optimal road inclination.

*CityMakers* is a service developed from the collaboration of the City of Paris with NUMA, Renault, AXA, NISSAN, RCI Bank and Services. It aims at bringing together local start-up companies, experts, stakeholders, individuals and public bodies for the promotion of urban mobility (Bohic 2017). According to the official website of the application (CityMakers 2017), this program / service is split into two parts, namely the part "Think" and the part "Make". Under the first stage of "Think", a series of events is planned in order a common vision to be established; while at the second stage of "Make", experimentation is taking place for achieving new and innovative ideas. There is a mix of methodologies, where traditional engagement tools are combined with a variety of innovative processes in the effort to promote urban mobility and e-mobility.

Developed in England, *Tell us Toolkit* platform includes a wealth of tools targeting empowering of societies in decision-making processes regarding issues related to transport infrastructure and the urban environment. The platform is cloud-based and makes use of a complete Geographic Information System that can easily receive information from a variety of users on a wide range of urban and environmental issues, promoting community engagement (Tellus Toolkit n.r.).

*CoUrbanize* is another web platform studied in the context of this work. This endeavour has initiated as a start-up run by Karen, an alumni from the MIT Department of Urban Studies and Planning (DUSP) (Zhang, 2014). CoUrbanize is used in major American cities, such as New York, Atlanta and Boston. Through this platform several actors, stakeholders, residents' associations, businesses and investors can express their ideas on specific projects, promoted in the wider region

(Siangliulue et al. 2016). The platform supports community forums, participatory planning processes, information and awareness campaigns, surveys and a variety of other processes that facilitate the design of public space projects, infrastructure, urban mobility etc. A critical element of this platform is the process of grouping comments and voting for a multitude of projects, where users can comment on what is excellent, what is missing and what could be improved.

Nextthamburg kicked off in 2009 (Anastasiou 2015) and is an independent citizen-based think-tank initiative, through which citizens as well as urban planners and designers discuss about the future of the city (Pereira et al. 2012). The goal of this initiative is to enable the creativity and promote commitment of a large proportion of residents of Hamburg to urban development objectives. For reaching this goal, residents propose their ideas and formulate a vision of the future of their city via this online platform. More specifically, they have the right to contribute with new ideas or comment existing ones (Anastasiou 2015). Simultaneously, the organization “Nextthamburg” have developed a mobile application called “Nextthamburg mobile” that allows smartphone users to virtually tag and categorize their environment. By this application, users can write a comment about specific places they visit and upload a picture. These data (location, picture and text) are uploaded to a public webpage and presented on an interactive map, available to everyone interested in (Hoffken and Streich 2011).

Experience gained from the above examples reveals that the use of innovative participation tools lies at the core of the efforts towards strengthening public engagement in urban and transportation planning processes in the information and communication era. The use of a Web platform for direct interaction, between citizens and stakeholders on the one side and decision makers on the other, reflects a trendy ICT-enabled practice, where the spatial delineation of problems and expression of ideas in the urban discourse are expected to contribute to quicker and cost-effective planning of solutions for setting up current inefficiencies in urban environments.

The proposed methodology for the case study of Rethymno is based on the afore-mentioned context; and attempts to successfully address case specific aspects with respect to the urban mobility context.

## 4 Methodological Approach

Taking into account the work of Jennings (2001), according to which public participation is a quite useful research approach in urban planning and mobility research projects, the common inquiry, addressed in the methodological approach of the Rethymno case study, is “how can the widest possible public participation in the development and implementation of a SUMP be ensured?” To successfully deal with this inquiry, a range of case studies, working out similar cases, was explored and best possible ideas were identified.

The city of Rethymno was selected as a pilot case study for the implementation of the proposed methodology, as there is an ongoing SUMP for the city under the



auspices of Civitas Destinations' project, aiming to address mobility and tourism aspects in order sustainable development and better quality of life to be pursued.

The first step was the delineation of the study area (Fig. 2), which incorporates the city center, the suburbs as well as the wider rural area. Critical parameters of this study area were assessed, such as land uses, transportation network, satellite settlements, travel frequency, tourist attraction nodes, social infrastructure etc.

As a second step, analysis was carried out regarding population and demographic characteristics as well as socio-economic developments. This analysis, although constituting a necessary stage for getting insight into the peculiarities of the study area for purposes of SUMP development / implementation, it has also been used for identifying community and stakeholders' aspects and attributes; and grasping the ideal mix of engagement tools to be used for enhancing public participation.

**Fig. 2** Area addressed to SUMP development and implementation (Own elaboration 2017)



The fact that a large part of the population falls into the young age group, being secondary education graduates and working in the tertiary sector, was of decisive importance in the decision to adopt a more technological stand in community engagement in the specific case study and develop innovative, digitally-enabled tools in the SUMP process. Hence, next steps included research on this kind of tools for public participation, exploring various cases of similar planning projects. Good practices were selected to suit the key characteristics of the area, taking into account the residents and visitors' profile.

The management of participation processes as well as information and awareness raising techniques is oriented to provide answers to above mentioned key inquiry. The proposed methodological approach, depicted in Fig. 3, consists of two parallel processes to ensure enhancement of participation through traditional and digitally-enabled methods.

Traditional techniques refer to:

- a. *Targeted interviews*: these aim at gathering data from stakeholders' representatives, who can transfer collective perception on the issues concerned. According to LeGates (2011) this method provides an easy way to understand a part of the public, regardless of the complexity of the studied subject.
- b. *Questionnaire survey with stratified sampling*: the purpose of using this survey is to grasp respondents' viewpoint for a number of issues concerning the study area (Kyriakidis and Siolas 2014). Questionnaire survey is a cost-effective data collection method (Jack and Clarke 1998; Strange et.al. 2003), representing a rather passive engagement tool (Dede et al. 2012; Stratigea 2015). However, given the fact that much of the issues raised were spatially referenced, map-based questionnaires were used as tools for gathering more spatially-based answers to issues of concern.

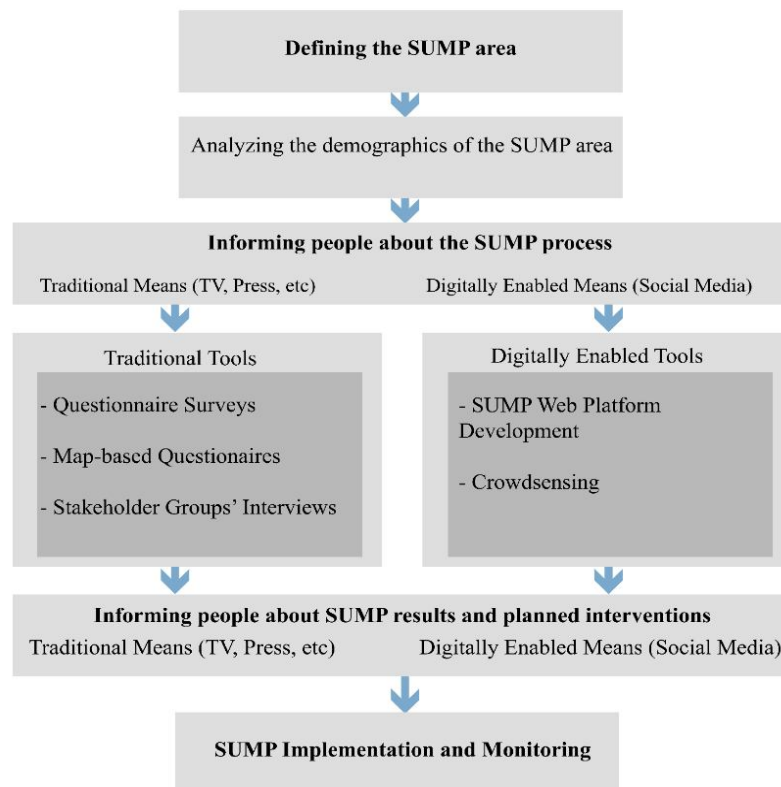
Two more digitally-enabled tools are planned for citizens' engagement, use complementary to interviews and questionnaire survey, namely:

- a. *A web platform*: this aims at facilitating interaction between citizens and decision makers. By use of this platform, the research group of this work is interested in gathering information about the residents' opinion on their city, their perception with regards to its scarcities, inadequacies and poor transportation planning. The platform will provide citizens the chance to express their views and ideas through use of a headline, followed by a short description as well as an image and an attachment. Ideas collected through the platform will be organized under specific thematic categories. The user will be able to select the category that suits best to her/his idea. Indicative categories include: walking, cycling, public transportation, urban green spaces, fleet management, e-mobility, mobility management, urban planning, smart technologies, transportation pricing, etc.
- b. *Data collection with citizens acting at a voluntary basis*: this action is supported by citizens who contribute voluntarily and collect primary data for a series of environmental variables, such as noise levels, temperature, luminosity etc. This process, functioning as a *crowdsensing exercise* by use of smartphones, has followed the steps of a series of similar surveys (Pödör and Révész 2014; Garcia-Marti 2014; Aletta et al. 2016). More specifically, people carry their smartphones, i.e. personal devices equipped with applications / sensors that provide *local geospatial information and knowledge* (Stojanovic et al. 2016) *at no cost* (Schweizer et al. 2011). According to Schweizer et al. (2011), smartphones are decent platforms for gathering environmental data, e.g. sound levels that are recorded by the microphone incorporated in the device, location of information through GPS equipment etc. Elaboration of data gathered through crowdsensing can support the easy, quick and cost-effective drawing of conclusions about the current state of the above elements in the study area.

Elaboration of data collected through the web platform and crowdsensing technique is in progress.

Data gathering through public engagement by means of the above digitally-enabled approaches is coupled with a series of parallel activities that are planned to inform the public before, during and after the implementation of the SUMP (Fig. 3). Actions for raising stock of information of the local community on SUMP are deemed necessary. These include a suitable combination of traditional and innovative communication approaches. Traditional approaches include press releases, TV and press briefing (especially during implementation and post-implementation phases), organization of interactive events (e.g. during the European Mobility Week) and consultations. With respect to digitally-enabled tools, social media campaigns play a key role. Their main goal is to support the spreading of information and the raising of public awareness about the SUMP. The use of social media is a widespread practice in recent years due to their advantages, such as their potential towards the immediate propagation across the reporting area, resulting in direct communication between the transmitter and the receiver.

**Fig. 3** Steps of the methodological approach for enhancing public participation in Rethymno (Own elaboration 2017)



Social media provide immediate flexibility and, depending on the particular target audience, they can address different strategies and communicate them. At the same time, the minimum cost for promoting actions through social media makes them an attractive mean and a cost-effective tool in support of an information campaign (Dimitriadis and Tzortzaki 2010).

## 5 The Rethymno Case Study

The methodology outlined in Fig. 3 was applied in the city of Rethymno, targeting both the data collection and the public engagement in the SUMP decision-making process.

More specifically, questionnaire surveys have started back in summer 2017. To date, 534 questionnaires were addressed to residents and 72 were addressed to special categories of visitors, such as cruise tourists or tourists being for their first time in Rethymno or even those returning regularly to this place. The subject of the questionnaires was related to the daily trips of the respondents, their hotel or housing location, preferred destinations, work location and way of commuting. Bicycle use or potential bike use was also explored. Other surveys included questionnaires to specialized groups, such as school and university students with almost 498 responses for commuting habits, as well as surveys addressed to the academic community, which are still in progress (with almost 218 responses to date).

Twenty seven indicators were measured regarding public transport, car and bicycle use, road safety and several others, according to a methodology developed by Destinations' project for each indicator. Such data gathering allowed a detailed assessment of the current situation in terms of mobility pattern and related problems. Specific indicators that can assess the current mobility conditions with regards to public transport include the "Accuracy of time keeping" and "Average occupancy". Results obtained as to the first indicator showed that there is a relative delay in the majority of public transport routes; while with regards to "Average occupancy", evidence shows a relatively low average occupancy. These indicators were supplemented by another two indicators, concerning the "Accessibility" of transport vehicles and the "Level of service" offered. Data collected with regards to these indicators have revealed a rather neutral attitude of residents.

Moderate satisfaction from public transport is one of the key issues related to low average occupancy of private vehicles (1,386 passengers / car), which is directly associated with high rates of private car use. Accordingly, the number of available parking spaces in the city is high, with the number of on street free parking spaces amounting up to 69.842. On the contrary, the use of the bicycle appeared to be relatively low, with the total length of bike paths being only 7.38% of the total length of urban road network. Low bicycle usage is also associated with the low number of bike-sharing bikes and stations per capita, which amounts up to 1 bicycle per 1207 residents.

The above results capture a distinctive picture of the current situation in the study area. The services provided by public transport can definitely be improved,

similarly to bike services. On the contrary, car and motorcycle use is unlimited and high, with private cars being the major transport choice for most residents. A further confirmation of the above findings is expected to take place through the utilization of the web-platform, where residents have already been invited to engage by grasping aspects of the current situation and current inefficiencies as well as proposing specific solutions to resolve them.

It should be noted that the questionnaire survey was conducted in a relatively short period of time. Moreover, worth noticing is the inclination of respondents to engage in the SUMP process. In fact, when asked about their willingness to participate, even more actively, in the next phases of the SUMP, the majority of them replied positively, expressing the view that they would like to see their city changing and addressing key issues regarding traffic circulation and regeneration of public places. Another key finding concerns the particular interest of students, partly explained by the setting of students' questionnaire in the specific spatial context surrounding their school.

At Phase I of the SUMP, more interviews were also conducted, addressing a variety of public and private bodies. More specifically, 20 interviews focused on assessments of transport infrastructure, access to school for students and teachers, and tourism mobility. 11 more interviews concerned disabled mobility. The latter focused on needs' identification of this specific group and gathering of proposals on specific solutions, as these are identified by their representatives.

With regards to the digitally-enabled tools (web platform and crowdsensing), the web-platform (<https://www.rethymnomobility.eu>) has already been developed, where citizens shall submit their ideas. Georeferenced material will soon be supported in order for citizens to "locate" their area of interest or place of desired intervention. This application is expected to be a map-based tool, which shall enable all stakeholders and individuals to access the actions and be active participants to city and traffic planning.

Concerning the gathering of information with crowdsensing techniques, a campaign to inform the public about the overall action of participation has already started in order to attract volunteers. A significant number of volunteers is required, in order reliability of data provided to be increased (Basiouka and Potsiou 2012 and 2013; Apostolopoulos et al. 2016). Given the fact that there is a significant possibility that part of the volunteers is not familiar with crowdsensing procedures, a technical training session is already planned, while a second can also be organized if required. Within this session, participants will have the opportunity to acquire knowledge on the research specifications and the process of SUMP development and implementation, as well as their critical contribution on the data collection process.

Finally, of great relevance to the successful outcome of the whole SUMP planning experiment is the raising of public awareness. Towards this end, a social media campaign is organized. This campaign was designed to act along with formal communication actions, such as press releases. Communication actions are implemented by the research group in cooperation with several stakeholders' groups. The latter are expected to support all activities that promote sustainable mobility, especially in the context of specific events such as the European Mobility Week.

## 6 Conclusions

The need to promote sustainable development has become increasingly apparent in recent years. This implies reconsideration of spatial planning directions and processes. Seeking to achieve smart, sustainable, inclusive and resilient cities of tomorrow, as declared in the EU urban agenda, brings to the forefront the issue of public participation. Participatory planning endeavours seem to form the main streamline in coping with contemporary great challenges, especially in the context of urban environments.

SUMPs, on the other hand, are strategic plans for integrated urban and transportation planning, hence act as principal plans within the urban development context; and their implementation is expected to have a critical positive impact on modern Greek cities. Such an implementation incorporates policy measures such as the reduction of motorized traffic, the increase in space availability for pedestrians and cyclists, etc. These, in turn, imply a certain emphasis on the social use of public space, in contrast to the practically “inaccessible” areas of motorized traffic. Such a *paradigm shift* to the organization of cities is expected to affect the architecture of building codes and urban design, since the streetscape is reshaped on behalf of pedestrians instead of car users; whilst citizens’ perception and approach with regards to commuting or leisure is also reconsidered.

For shifting to the new paradigm, i.e. develop and implement proper interventions in the urban space, a participatory approach lies at the core of this effort, targeting enhanced participation of recipients of such plans. Indeed, the primary objective for plans’ realization is not simply to ensure social consensus, but to achieve real engagement of citizens in the planning process in order to realize, accept and monitor changes taking place in their city.

This paper presents a *participatory planning methodology* that makes use of a mix of traditional and digitally-enabled tools. At the core of this methodology lies a *Web platform*, forming the ground for interaction and cooperation among various city groups. Through this platform, citizens can interact with decision makers and formulate ideas to ameliorate current city’s inefficiencies. Thus, citizens are able to better understand the type and causes of problems, the planning goals set out of them, as well as the potential solutions for their treatment. People assess planning issues; get acquainted with planning processes; evaluate different ideas; and are assisted to formulate own perceptions and thoughts. This allows maturing of local community and smoothing of the implementation process of selected plans, largely reflecting awareness raising, understanding of constraints and options available to problems’ solving, consensus building and own contribution to final decision. Beyond the uploading of ideas and suggestions in the platform, other supporting data gathering tools are used as well, such as map-based researches and questionnaire surveys as useful tools, contributing to the enhancement of research group’s understanding as to the perceptions of the public.

A particularly innovative initiative is the *participatory data collection*. Objective of this action is to search out the actual relationship of the citizen with the city and to collect a series of data, mainly environmental, such as noise, luminance,

temperature levels, etc. Through the participatory data collection, a cost-effective, quick and reliable way of collecting geographically defined data was established, allowing the research group to better understand the pilot study area and, following the planning process steps, to make more appropriate and case-specific proposals. This methodological approach has already been applied in the development of other SUMPs across Greece, and the data gathered have been proved to be reliable and resulting in reasonable conclusions.

The above methodology was proposed to be tested in the city of Rethymno, as there is an ongoing SUMP in this specific city, being part of the CIVITAS initiative. Until now, similar methodological tools, such as the deployment of a Web platform for collecting ideas and the collection of data using smartphones, have been tested to other Greek cities, such as Kozani and Drama. Nonetheless, a more integrated approach is applied in the case of Rethymno as people participation was the core-idea in implementing the SUMP. More participation tools are proposed to be used and more participants are going to be invited in the participation process.

Given the fact that this research is at an early stage, and the SUMP is under development, it is premature to draw conclusions on the degree of implementation of the action, namely the number and profile of the participants, proposed ideas and indicators that have emerged for the various SUMP related issues. However, what is worth highlighting is the willingness of citizens to engage in the process of developing the SUMP, and even more actively in the process of its implementation, as seen from the questionnaire survey.

Lastly, conclusions cannot be drawn as to the use of the web-based participation tools, as they have not yet been fully implemented. Their introduction into the proposed methodological approach aims at achieving a higher level of participation and engagement, drawn upon their communicative power; and attracting qualitative spatially-referenced community proposals. They are also perceived as complementary to the traditional engagement tools, as evidence-based results from various studies have already shown, through introducing a new spirit of interaction and citizens' empowering on local decision-making. Reactions of local community with regards to these means will be assessed in order to identify failures, explore potential causes and accordingly re-orient the SUMP planning effort.

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