TeMA

Journal of
Land Use, Mobility and Environment

This special issue collects a selection of peer-review papers presented at the 8th International Conference INPUT 2014 titled "Smart City: planning for energy, transportation and sustainability of urban systems", held on 4-6 June in Naples, Italy. The issue includes recent developments on the theme of relationship between innovation and city management and planning.

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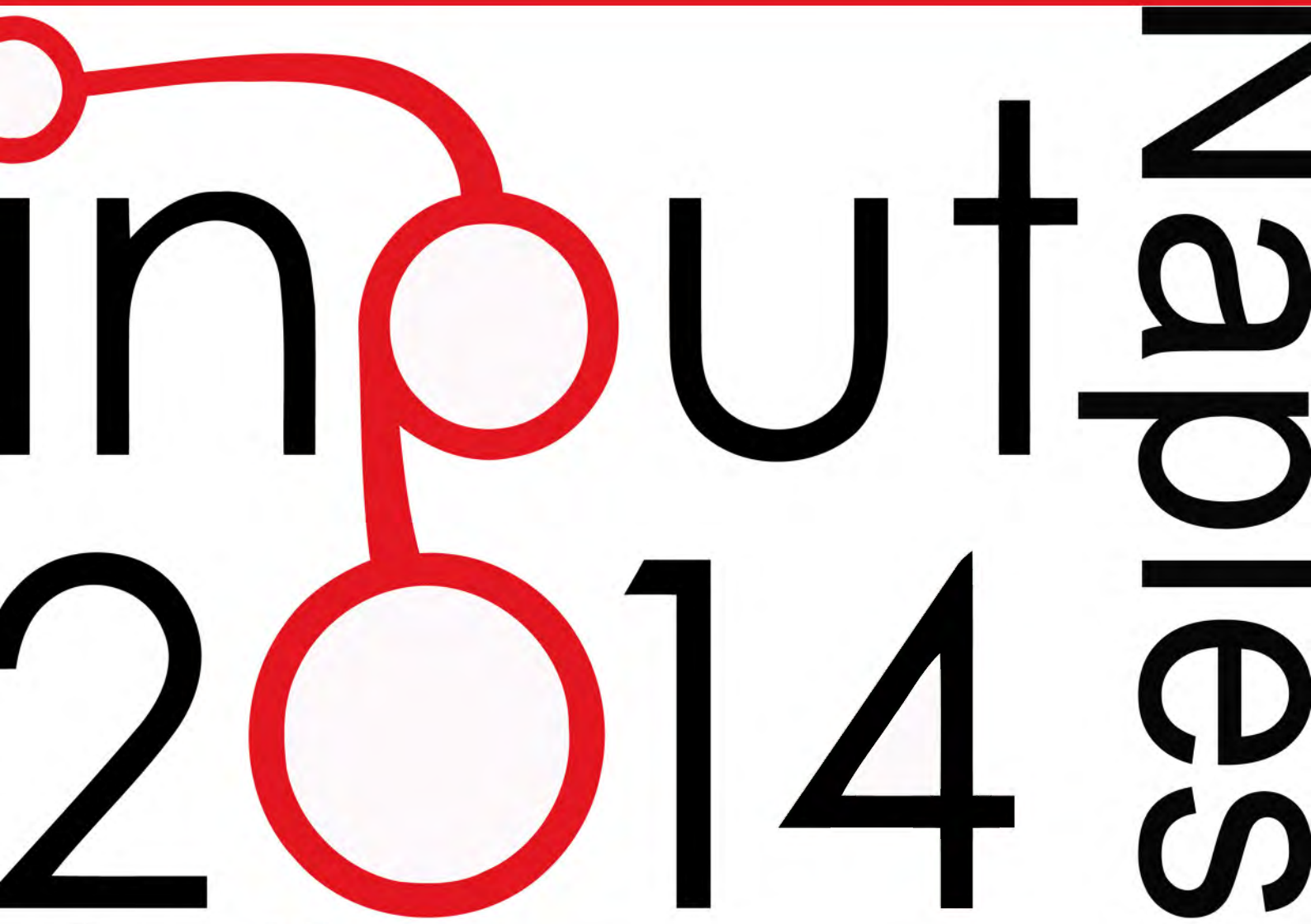

Smart City

planning for energy, transportation and sustainability of the urban system

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Special Issue, June 2014

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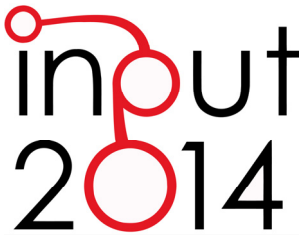
This special issue of TeMA collects the papers presented at the 8th International Conference INPUT 2014 which will take place in Naples from 4th to 6th June. The Conference focuses on one of the central topics within the urban studies debate and combines, in a new perspective, researches concerning the relationship between innovation and management of city changing.



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EIGHTH INTERNATIONAL CONFERENCE INPUT 2014

SMART CITY. PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

This special issue of TeMA collects the papers presented at the Eighth International Conference INPUT, 2014, titled "Smart City. Planning for energy, transportation and sustainability of the urban system" that takes place in Naples from 4 to 6 of June 2014.

INPUT (Innovation in Urban Planning and Territorial) consists of an informal group/network of academic researchers Italians and foreigners working in several areas related to urban and territorial planning. Starting from the first conference, held in Venice in 1999, INPUT has represented an opportunity to reflect on the use of Information and Communication Technologies (ICTs) as key planning support tools. The theme of the eighth conference focuses on one of the most topical debate of urban studies that combines , in a new perspective, researches concerning the relationship between innovation (technological, methodological, of process etc..) and the management of the changes of the city. The Smart City is also currently the most investigated subject by TeMA that with this number is intended to provide a broad overview of the research activities currently in place in Italy and a number of European countries. Naples, with its tradition of studies in this particular research field, represents the best place to review progress on what is being done and try to identify some structural elements of a planning approach.

Furthermore the conference has represented the ideal space of mind comparison and ideas exchanging about a number of topics like: planning support systems, models to geo-design, qualitative cognitive models and formal ontologies, smart mobility and urban transport, Visualization and spatial perception in urban planning innovative processes for urban regeneration, smart city and smart citizen, the Smart Energy Master project, urban entropy and evaluation in urban planning, etc..

The conference INPUT Naples 2014 were sent 84 papers, through a computerized procedure using the website www.input2014.it . The papers were subjected to a series of monitoring and control operations. The first fundamental phase saw the submission of the papers to reviewers. To enable a blind procedure the papers have been checked in advance, in order to eliminate any reference to the authors. The review was carried out on a form set up by the local scientific committee. The review forms received were sent to the authors who have adapted the papers, in a more or less extensive way, on the base of the received comments. At this point (third stage), the new version of the paper was subjected to control for to standardize the content to the layout required for the publication within TeMA. In parallel, the Local Scientific Committee, along with the Editorial Board of the magazine, has provided to the technical operation on the site TeMA (insertion of data for the indexing and insertion of pdf version of the papers). In the light of the time's shortness and of the high number of contributions the Local Scientific Committee decided to publish the papers by applying some simplifies compared with the normal procedures used by TeMA. Specifically:

- Each paper was equipped with cover, TeMA Editorial Advisory Board, INPUT Scientific Committee, introductory page of INPUT 2014 and summary;
- Summary and sorting of the papers are in alphabetical order, based on the surname of the first author;
- Each paper is indexed with own DOI codex which can be found in the electronic version on TeMA website (www.tema.unina.it). The codex is not present on the pdf version of the papers.

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SMART CITY
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SPECIAL ISSUE

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CROWDSOURCING

A CITIZEN PARTICIPATION CHALLENGE

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ABSTRACT
This paper is a work in progress on Crowdsourcing. First, its concepts and importance are discussed and then its value for citizenship and urban planning. The motivation for participation and the display of geo-tagged information, as well as its possible applications in dynamic spatial temporal issues are presented, as well as its different approaches and applications. Furthermore, Crowdsourcing is discussed when the "ONVCêVIU", a VGI case study, is presented, revealing its origin, objective, free platform comparison - to select the proper tool to implement, the project's main challenges, results so far and further steps to be taken. To conclude a short review of the author's vision about what is to come in the future research.

KEYWORDS
Crowdsourcing, Volunteer Geographic Information, Citizenship, Urban Planning.

1 CROWDSOURCING ITSELF

This article presents a work in progress that seeks to understand the processes and applications of 'crowdsourcing' in urban planning. The term refers to the collection of geo-referenced data through tools such as VGI (Volunteer Geographic Information) and applications / interfaces known as APIs - Application Programming Interface. The information gathered from the crowd currently allows an infinite range of applications in various areas using geographic space as an element that composes analysis. This study is recent and utilizes state of the art cartographic technologies among others.

A crowdsourcing is a virtual geo-database collection with the possibility of voluntary cooperation. Other type of geo-databases may be acquired through API - Application Programming Interface - without the user having explicit knowledge that their information is being used. Interactive devices are used to view record and share spatially contextualized information. It marks spatial structures and promote communication about and between users. It enables communication information on usage and show new perspectives in geography, space and time. It utilizes the principle of dynamic mapping, which reveals mobility and concentration about groups of people around certain places or events during certain time periods.

It is important to differentiate the Crowdsourcing from VGI - the first is not voluntary. Despite of the information been posted voluntarily, it was collected through a data mining process and data are used without users having knowledge of it. The second depends on involvement and citizen participation. Crowdsourcing data mining today means a powerful form of search behaviors, trends and values.

The relevance of the subject is justified by the number of stakeholders in the decision processes of spatial and urban planning, among them: citizens, urban planners, chambers, retailers, manufacturers, transport companies, large corporations, banks and politicians[1].

To Miranda et. al. (2011) there is a special interest in VGI dedicated to urban mappings. We believe the most important and unique contributions that citizens can do related to their individual interests and first-hand knowledge, those are more related to applications and data from local GIS.

The possibility of interaction is through the diverse range of users. To various authors people are not seen only as consumers, but as contributors and creators of information (Silva e Davis Jr., 2008 and Goodchild 2007). This relation may completely change the way communities can take position towards many decision about their everyday space.

"Given a server with appropriate tools, the various pieces of the patchwork can be fitted together, removing any obvious inconsistencies, and distributed over the Web. The accuracy of each piece of the patchwork, and the frequency with which it is updated, can be determined by local need." (Goodchild, 2007). To the author, in essence, such developments contribute to a growing reversal of the traditional top-down approach to the creation and dissemination of geographic information.

1.2 VALUES OF CROWDSOURCING

VGI represents an unprecedented shift in the content, characteristics, and modes of geographic information creation, sharing, dissemination, and use (Sui, et. al. 2013). The social-political scene would improve and be improved by stakeholders participation through the use of VGI and understanding of time-space patters. It promotes empowerment, participation, grater political legitimacy, improved decision making, enhanced

[1] Class notes of the subject "Supporting Planning Processes by the Use of Dynamic Visualization" ministered by Prof. Dr. Stefano Pensa from Politecnico di Torino, Italia, at NPGAU – Núcleo de Pós Graduação em Arquitetura e Urbanismo at Universidade Federal de Minas Gerais in second semestre 2013.

services (and public service) delivery, it enables better management and planning of land use change, greater understanding of environmental issues and achievement of sustainable development, promotes innovation, knowledge gain, new business opportunities as well as applications and job creation (Roche, 2013:20). For the author, the value of VGI has been dramatically high in terms of social and political changes and also in terms of social cohesion. The author calls the attention for VGI as a potential learning and innovation tool and indicates it as a social learning process:

"…a spatially enabled citizen is characterized by their ability to express, formalize, equip (technologically and cognitively) and of course consciously – or unconsciously – activate and efficiently use their spatial skills. We argue that being involved in VGI activities is actually one of the more preeminent means for individuals to develop their spatial enablement. This improvement is another characteristic of the social value of VGI."(Roche, 2013: 21 in: Sui, et. al.)

On the web there is an interesting use of a crowdsourcing called "mass value assessment". Here, projects such as Trip Advisor website, Foursquare and others are indicated "to provide interesting insights into the ways that individuals and groups can use VGI to reshape and redefine how places are represented and understood" (Roche 2013:26 apud Graham and Zook 2011 in: Sui et.al.2013).

Users are not seen only as consumers, but as contributors and creators of information (Silva e Davis Jr., 2008 e Goodchild 2007). A great interest in more spatial enabled individuals is particular interest of this article, as it is one of the key instruments to our PHD study methodology to better seek a greater construction of a society more prepared for spatial decision making and it practicing its citizenship.

1.3 MOTIVATION FOR PARTICIPATION

Participation and its motivation lead to several questions that are very important and were made by Goodchild (2007). Why is it that citizens who have no obvious incentive are nevertheless willing to spend large amounts of time creating the content of VGI sites? What kinds of people are more likely to participate, and what drives them to be accurate (or inaccurate)? To the author, self-promotion is clearly a motivating for web activity.

As shown by Professor Dr. Michele Campagna in a course presented to our work group, participation on his VGI project "Place, I care" only happened during a certain period of time. We are also experiencing that kind of issue in our beta projects (a case study shown here and others constructed by students at a subject taught by the author and supervised by Professor Dr. Ana Clara Moura at Architecture and Urbanism course called "Collaborative Planning and Citizen Participation"). It leads to the comprehension that people have low motivation to practice citizenship and we conclude that alternative motivations should be part of a VGI project.

As explained before there are two types of crowdsourcing projects, one is VGI where the person volunteers to participate and other one through API where the person in his own social media experience offers geotagged information.

The perception is that a person should have strong motivation to take part of a VGI project such as a commitment, is really interested in the results or the VGI project clearly leads to policy of interest of the person. On the other hand, a crowdsourcing project conducted through API can use social media geo-tagged information where motivation is more related to self-promotion. In a different level many users contribute to 2.0 web as volunteers as a way to let information available to friends and relatives, without being worried if it will be available to all. (Goodchlild, 2007). This should explain the Picasa website popularity but it does not explain Flickr and Wikimapia where the content is completely anonymous.

1.4 APPLICATIONS

Dynamic mapping is a research line benefited by crowdsourcing and has been widespread in the last years by mapping elements that are well defined in terms of time and space. One of the basic principles of dynamic mapping is to reveal mobility and concentration of groups of people around certain places or events. For example, the origin of calls made by cell after a certain fact[2], the number of check-ins on social networks conducted in a location at a certain time or period (time of day, month of year, etc.). Location is a clear example of the information that can be used by the API's.

This was shown in the article "Discovering Landmark Preferences and Movement Patterns from Photo Postings". The paper shows how the trajectory was mapped during a certain period of time to determine preferred paths in Seattle concluding among other things:

"Spatiality of people's interests; locations of landmarks and events that are of interest to photographers; temporality of people's interests; dates of photographing places and events and the seasonality of people's interests; spatial extent of people's interests; boundaries of areas and events represented on photographs; connectivity between photographed places represented by a network of moves connecting places of interest; travel patterns of photographers and their temporal characteristics" (Jankowisk at. al. 2010: 850).

Other really interesting work related to time and space was published by Andrienko et all. (2013), "Thematic Patterns in Georeferenced Tweets through Space-Time Visual Analytics". The authors discovered through an API what topics were discussed in Seattle and their cluster distribution. They also found out their time distribution and topic relation concluding patters of time and space of twitter's posts are very mixed. In other words, when and where certain topics occupy peoples' minds are intensive related; as examples the work proved that "food" was twitted during lunch and dinner times, and people tweet about "transportation" most during workday rush hours.

The dynamic spatiotemporal mappings need assistance for reporting results and collecting information from the crowd. To support spatial analysis and its communication, geovisualization tools shall be very helpful. Great power to information are conferred to the domain of spaces and elements composed; it brings mastery over elements, relationships and topology causing the reader a better understanding of space and landscape, enhancing the information passed by attributing spatial arrangement of the elements that composes a landscape.

2 "ONCÊVIU" CASE STUDY

Our VGI beta project aims to test the model and contribution methodology established in www.fechoseucuido.crowdmap.com website, which the researchers call "ONCêVIU", it was created by NGOs Primo - Primates of the Mountain and CRESCE Institute - Reference Center for Education and Culture of Sustainability at Espinhaço's[3] and the support of GIS Laboratory of the School of Architecture of UFMG (Federal University of Minas Gerais) and DCC (Department of Computer Science at UFMG). The project is set in the context of the community campaign: "Fechos, eu cuido!" (www.fechos.org.br) and aims along with researchers unravel the community interaction with nature through Geographic Information Voluntary model.

[2] See http://senseable.mit.edu/realtimerome/ access in November 2013.

[3] *Espinhaço* is a Biosphere Reserve and mountain chain at Central Minas Gerais protected by the Unesco's Man and Biosphere project.

Several platforms were analyzed to determine which one would be used to "ONCêVIU?" Project. The choice was made by the Ushahidi because it owns Smartphone applications both at apple store and google play, allows data download, and have many possibilities for the platform administration.
Another very interesting thing about Ushahidi/Crowdmap is that through the website is possible to create a project website without mixing the map information with other projects. They have a great support team and many pages of discussion forum. Another interesting thing about Ushahid is that according to their website (www.ushahidi.com accessed in March 2014) they have grown from an ad hoc group of volunteers to a focused organization in 2008. Their current team is composed by individuals with experience ranging from human rights work to software development. The website reveals that "Ushahidi", means "testimony" in Swahili, and was a website initially developed to map reports of violence in Kenya after the post-election fallout at the beginning of 2008. Since then, the name "Ushahidi" has come to represent the people behind the "Ushahidi Platform". Their roots are in the collaboration of Kenyan citizen journalists during a time of crisis.

PLATAFORM	DOWNLOAD	SMATPHONE	OTHER INFORMATION
www.urbotip.com	Yes to registered partners	Yes, android and IOS	The website is a mixture of all applications, does not allow photo posting and page customization.
http://geo.lbd.dcc.ufmg.br/strepitus/	yes	no	Developed by Computation Science Department (DCC) at UFMG (Federal University of Minas Gerais, Brazil). Does not have a very friendly interface and page customization.
http://maps.mootiro.org/	Does not inform	no	Does not allow customization of the website.
www.crowdmap.com (Ushahidi)	yes	yes	Allows customization of categories and website, photo posting, Facebook interaction and other functions.

Tab 1 Free VGI platform comparative

The collaboration began to be collected in August 2013, some adjustments to the project must still be performed as change of address access 'http://fechoseucuido.crowdmap.com' to a friendlier address for better understanding of the user and through links from other related websites.
As collaborations are being collected and the project spread among the local community studies of the tool and the theory that is based on this type of application are still being developed within the Geoprocessing Laboratory of the School of Architecture and conducted by the authors of this article.
Despite the project was intensively announced at several events, such as posters been placed in the community pubs and other places, contribution has not been many. The project has had, to date, only 199 visitors performing 240 hits and 47 reports. Of the 47 reports, 15 are in the landscape category, 15 in the fauna category, flora had 12 posts, 3 posts about complaints, 1 report on sewage and garbage category and no account under water3.

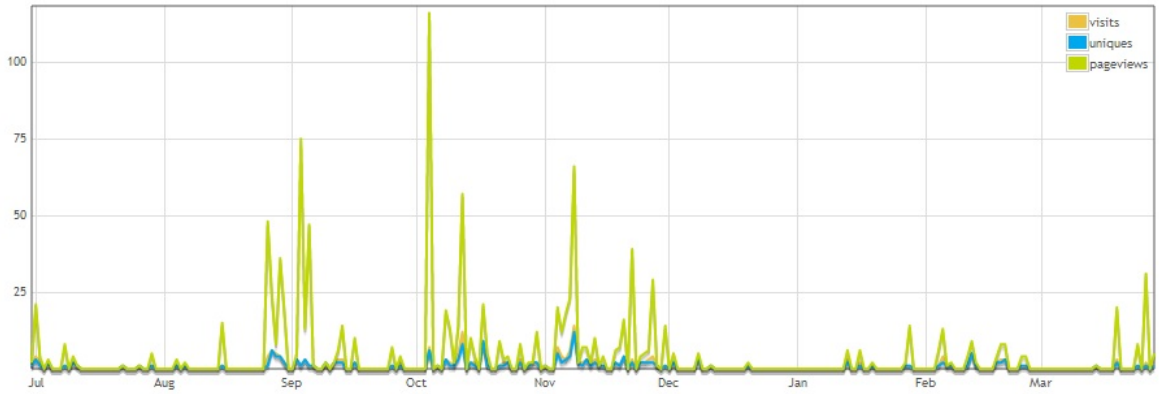

Fig. 1 Admin dashboard of "ONCêVIU" project. Access in March 2014.

The admin dashboard explains that visit is a record of a unique visitor coming to the site more than 30 minutes past his/her last page view. Unique is the number of individuals coming to your deployment; Unique Visitors are determined using cookies. In the case that a visitor does not have cookies enabled, they will be identified using a simple heuristic taking into account IP address, resolution, browser, plugins, OS, etc. And page view is the total number of pages that visitors have viewed on the site.

To broaden the dissemination of the project, next steps will be schedule at local schools posting activity to try to engage teens. Also as demonstrated, another need is to change the project address (http://fechoseucuido.crowdmap.com) for some simpler, and there is likely to be www.institutocresce.org/onceviu.

Posting of reports and comments on the fan page of Instituto CRESCE (www.facebook.com/institutocresce) is other activity that has been performed and, according to statistics from the fan page, it did not reach the public. On the other hand, the project banner posted on November 10, 2013 had 335 views, 55 clicks and 24 "enjoy", comments and shares in the publication. This analysis shows that the reviews of posts in the crowdmap posted on Facebook are not giving results, but the creation and dissemination of graphic works can be more effective.

Another way of publicizing the project is through partnerships. In this sense contacts with Manuelzão Project, Rio das Velhas watershed committee and its subcommittees, communications media and NGOs are already being made hoping for a better dissemination of the project and enhancing participation.

3 ONCOMING CROWDSOURCING RESEARCH AND FINAL CONCLUSIONS

In a landscape conformation where there are many hills and mountains people who experience the space are usually immersed in river basins, or even at urban environments with physical barriers provided by urban facilities or buildings, landscape provides a barrier over look. An allusion to earthworms can be made, which live underground and have limited knowledge of what they will find a few inches away. If we understand well the concept and proposal of geovisualization, simulations and models of representation by mapping provide expansion of the horizon of the landscape area. The topological relations in construction of mental maps are represented and translated by simulated display bringing better understanding of what is presented around physical barriers beyond the horizon allowing a better understanding of space through the perception and cognition of the individual.

This realization brings out the conclusion that the field of geovisualization techniques facilitate communication and understanding of the issues addressed in the research related to events and arrangement of elements in geographic space. However, penetrations are required for the development of

tools and techniques in order to qualify geographical better communication. An example of what it hopes to achieve can be seen for the site (http://leandigo.github.io/leanorama/ accessed on November 26, 2013). Similar studies have been conducted by GIS lab at School of Architecture and Urbanism through virtual navigations performed. The dissertation of Vanessa Godoy published in February 2011, with the title: "Cultural Landscape of Rio de Janeiro Centro - Identification, Characterization and Representation Looking community with the support of cartography and Virtual Navigation" is a clear example of these efforts. The first efforts of the laboratory began in 2003 with the doctoral dissertation the coordinator of laboratory Ana Mourão Moura, which resulted in the book GIS in Urban Planning and Management (Moura, 2003), there are also chapters of the book (Moura 2009 and 2010), articles on the case study of the Capão Xavier Mine (Moura and Amorim, 2007), and the Estrada Real project that indicate the studies from the laboratory that them as well as the dissertation work of the Author oriented by Professor Ana Clara Moura “"Fragility and Potential Use of Landscape Study and Touristic Caring Capacity of the Serra do Cipó National Park – MG”(Borges and Moura, 2011) that also used panoramic views to determine community and tourists better fit into simulated amounts of people at the park’s main attraction.

The use of interactive devices for viewing, recording and sharing information spatially contextualized facilitates the participation of the reader, therefore, simulate a three-dimensional environment allows the eyes to feel 360° viewing space. Understand the difference between the zenith and azimuth vision is needed to better grasp the above concept - what is seen in the vertical and horizontal respectively. These modes of understanding and appropriation of space demonstrate how a regular citizen visualize and experience the landscape. The physical characteristics of azimuthal position of a person on the landscape, creates difficulties understanding the overhead perspective (horizontal). We know that despite the advent and understanding of tools like Google maps understanding and seizure of information by "ordinary" citizen gives the azimuth to the detriment of the zenith (Google street view at the expense of Google Maps). People understand better representations of space when watched horizontally, i.e.: simulating the human vision , when the target moves to the top (zenith) the way of understanding shall be changed , making it difficult to understand for some people.

Howard Gardner, an American psychologist and professor of cognition and education at Harvard School of Education, discusses the theory of multiple intelligences for a long time (Gardner, 1987), which is to determine different aspects of the human intellect which, according to him, are called intelligences. Gardner mentions a few types of intelligence, among them: body, spatial, logical-mathematical, linguistic, naturalistic, intrapersonal, interpersonal and musical. In describing the formation of the human intellect the author points out that people have levels / suitability of development of the different intelligences.

According to Gardner (1987) spatial intelligence is related to the ability to form a representation of the world. “In your mind you operate on that representation of the spatial world”. The author points out the capacity for spatial orientation, popularly known as sense of direction, the three-dimensional visualization capability, i.e. the ability to view the design any object, imagine and manipulate this object, view it from other angles.

Understand the mind of the main users of a VGI project 'ordinary citizens' is a way of apprehend information as well as to provide a combination of different "geovisualizations" about the landscape shall be a way to solve the problem of empowerment landscape among communities and better interaction for solving problems that deal with the tangle of landscape elements.

Therefore, a VGI should have a better geovisualization to provide search and dynamic interactive information for visualization of cartographic layers (webgis) facilitating the understanding and mitigating the problem of information shown on static maps.

There are certainly gaps in knowledge about how to present spatial information to regular citizens. This understanding and appropriation of space lead us to the formation of mental maps:

> *"Man, after capture information from the environment through sensory stimuli, immediately recognizes and compares experiences and can thus generate a mental map of the environment in which it operates affectively. In addition to identifying and relation, the observer gives meaning to objects and these objects often refer to observer memories and sensations that vary from person to person."* (Godoy, 2011:63)

The virtual simulation of scenarios allows transporting the mind to another place. Navigation provides a dynamic change eye for landscape (cultural or environmental) enabling empowerment and interpretation. There are many examples of this technique: virtual navigation in museums, environmental learning (i.e. the video "From Spring to the Tap"[4]), virtual navigation in parks, tourism support, presentation of projects of intervention in the 3D landscape mappings, cinema, animation, archaeological sites, etc... Miranda and others (Miranda et.al., 2011) indicate SDI – Spatial Data Infrastructure as other area that can benefit by voluntary contributions: (i) new layers of popular interest, usually not produced by official maps; (ii) an indication of the need for corrections and updates, (iii) inclusion of additional details of local interest, (iv) name registration and geo- tagging locations (geographic index).

Because of its unimaginable applications about the landscape comprehension and number of stakeholders that can be involved in Crowdsourcing is proved to be a great tool for urban planning either applied as a VGI project or through an API research. On both methodologies of collecting crowd information the gain of knowledge is clearly present. Especially when the urban planner leaves the designer authorial position decoder for the collective will and establishes boundary conditions of use that are representative of what is valuable to society.

All these possibilities demonstrate that great knowledge gain can be brought to many activities and contemporary problems of space management specially those related to managing the space such as urban planning. It is clear that the local information is generally perceived and understood more clearly by those who experience it and if they have the knowledge and proper tools to demonstrate that knowledge it can be of enormous advance and show wisdom decision making.

View the dissemination of geographic information between surveys that deal with elements of the landscape and the extension of the techniques of man's interaction with the process of information production on a micro scale through VGI's, shows that thinking in new directions to geovisualization is an important instrument of "power" and dominion over the territory as a tool for community empowerment.

The understanding of geovisualization becomes crucial to build effective VGI projects or more applications for communication and building understanding of space by users. The fact that it allows us to understand where there are geo occurrences listed in the database, the voluntary collaboration has been indicated as a key to the understanding of several factors, however there is still the barrier of empowerment of information to be arranged.

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[4] http://youtu.be/z5z7KWloQIQ accessed at March 2014.

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