

QUALITATIVE GIS AND SOCIAL JUSTICE IN THE URBAN MANAGEMENT

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1. Introduction

Multiculturalism and multi-ethnicity are increasingly transforming European cities: in this complexity, making right policies to guarantee the social justice and the quality of life is really difficult.

More generally it is an ethical problem. Society isn't uniform, and to safeguard the multi-ethnicity, giving all the citizens (women, children, strangers, young or old people) the same rights, we must change the way of making knowledge. Planners should adopt mixed methods (quantitative and qualitative) to analyse the urban context, and also representations should include all the different points of view, through new mapping systems. Traditional maps could be integrated with new typologies of drawings, like mental maps or similar, to be more inclusive and more representative of the reality.

ICT and digital mapping systems like Geographical Information Systems (GIS) can represent a valid support for this new geographical vision: for example, touch screen devices could be used in the participatory processes to draw collective digital maps, as an interactive document for the local governments and for planners.

The citizens' needs can be expressed with the maps' language, as well as the decisions are drawn on the master plan.

International researches about this theme have produced some interesting experiences of qualitative GIS, forced the traditional instrument's limits, using mixed methods and a multi-level interpretation of spatial context. In this way it is possible to build a new image, influencing the spatial perception and the hypothesis of future about the urban and regional development.

2. Social inclusion in the territorial analysis: a new method for a new urban democracy

Cities are evolving: in this complexity, making right policies for guarantee the social justice and the quality of life is really difficult. Consequently it is necessary improve the management of a social texture composed by different cultures, questions, opinions.

It is an ethical problem (Forester, 1989; Lo Piccolo and Thomas, 2009) that determines substantial consequences on the urban management, from different points of view (political, economic, social and cultural).

The traditional analysis of the urban context follows a rigid scheme: the planner observes the physical and the social aspects of the city, he analyses the urban connections and the economical-social dynamics, he finally expresses evaluations and opinions and anticipates future developments. In this way there is an unique way of knowing: the scientific point of view of the planner is the reference for the data interpretation.

However the increasing complexity of the social and cultural context of the contemporary cities needs another way to analysis and evaluation. Usually the urban policies are referred to a hypothetical person: an adult man, born in the same city where he lives, who has an average level of education (a frequent model is a person White Anglo-Saxon Protestant, WASP). The urban population are really more fragmented: there are many ages ranges, different sexual identities, different cultures, different opinions about the common services and the use of collective resources. In the city there are many rhythms, different uses of the same spaces in different times.

It is not possible to define a single point of view to represent the urban context in analysis. We need a multilevel knowledge, and an integrated system for analysis. The two-dimensional representation of the city or territory is too constrictive: there are many important elements to represent in the city map, but often they are immeasurable and we cannot compare them. This determines a representation problem: if we cannot have a common set of factors, we will choose a particular and specific parameter to select references and to draw consequently the other elements. The representation of the city, and generally the management of the urban dynamics, should be more democratic and inclusive (Lo Piccolo and Picone, 2014). In the Seventies the researchers started to introduce a critical interpretation of the scientific method to analysing: if we change the criteria of measure, we will change the results of the research. In this mutation of the scientific methods approach, especially in the human and geographical sciences related with the city, a great role has been represented by feminist critique to the theory of a universally valid knowledge, based on the principle of «eye sees what it wants to see» (Lo Piccolo, 2002, p.274). So we need a way to compare the different information we collect from the urban analysis, but this is very difficult because of their ontological difference (material and immaterial issues, quantitative and qualitative data). To this aim, we can utilize a mixed method, composed by qualitative and quantitative analysis, in various phases, to reach at the last a knowledge more complete.

Sara Elwood writes: «If all knowledge is partial, then incorporating multiple forms of knowledge is a fundamental practice of good science. So-called "expert knowledge" is but one of many valid forms of knowledge that may be brought to bear upon a research question, and experiential forms of knowledge be equally appropriate» (2011, p.383)

At this moment in the scientific community there is a debate about the fundamentals of mixed methods: some researchers (England, 1993; Hanson and Pratt, 1995; 2003) think that is correct to conduct separately different typologies of analysis, and then express an overall assessment; others researchers (Jiang 2003; Nightingale, 2003; Knigge and Cope, 2006) think that is correct utilize a mixed method in all the phases of the research, integrating different methodologies to analysis, to achieve a complex mix of results (Elwood, 2010).

Therefore the multiplicity of the urban contexts determines the necessity of a multilevel and integrated methodology of analysis and action.

3. Overview of the new ICT tools: e-participation and web interactive mapping

There are various technical instruments to enhance public participation in decision making processes: surely the ICT are really a great resource in this context. In my PhD thesis I analysed some of this application: in all the cases, the main objective was to improve the communication between people and administrator, or between different social groups in the city. The communication is the most important aspect in the participatory dynamic.

3.1 ETM and DEMOS-plan: PARTERRE project

The PARTERRE project (Electronic Participation Tools for Spatial Planning and Territorial Development) involves the following partners: the Tuscany Region, Sector Innovation and Research in ICT, University of Palermo and the company Urban Adventure Ltd in Italy; the company TuTech Innovation GmbH and the city of Hamburg in Germany; the University of Applied Sciences in Turku in Finland; the University of Ulster in the United Kingdom; the Community Council of Voroklini in Cyprus (Table 1). This project has been developed as part of the two strategic tools of interaction between users and information exchange, DEMOS-Plan (product from TuTech Innovation GmbH of Hamburg) and ETM-Electronic Town Meeting (produced by Urban Adventure Ltd), then applied to local circumstances.

PROJECT	TYOLOGY	ACTORS	
PARTERRE	European project, focused on territorial management by ICT and innovative technologies.	ITALY	<ul style="list-style-type: none"> ✓ Regione Toscana; ✓ University of Palermo ✓ Avventura Urbana s.r.l.
		GERMANY	<ul style="list-style-type: none"> ✓ TuTech Innovation GmbH ✓ City State of Hamburg.
		FINLAND	<ul style="list-style-type: none"> ✓ Turku University of Applied Sciences
		UNITED KINGDOM	<ul style="list-style-type: none"> ✓ Ulster University
		CYPRUS	<ul style="list-style-type: none"> ✓ Voroklini Community ✓ ANETEL society

Table 1. PARTERRE project

In the website of PARTERRE project we can read:

«The PARTERRE Consortium a public/private partnership consists of a balanced mix of academia, public authorities, SMEs and NGOs covering the breadth of Europe and is designed to provide a wide range of expertise on business, technical, government and scientific issues related to spatial planning, environmental assessment, Living Labs, public administration and eParticipation topics» (<http://www.parterre-project.eu/?consortium=1>).

In this context, the partners used two technologies to realize public participation related to discussion about local territorial topics: the Electronic Town Meeting (ETM) and DemosPlan (DP).

I would focus the discussion on ETM, because it is the typology of technology that the project is context, by the University of Palermo. It was an experience totally for many reasons, especially for the building of a new social, collective image of the city (Lynch, 1960; Memoli, 2005).

«With the Electronic Town Meeting, not only are the citizens directly involved in a public decision making process, but the issues discussed are also prioritized in a way that is immediately visible to policy designers. Recently, the Regional Government of Tuscany has imported the Electronic Town Meeting into its own policy practice, by organizing about ten initiatives of such a kind since 2006.

Over time, this has led to the creation of an Open Source, web-based application for collective discussion and voting support, which is integrated with a streaming server to host the participants who may be localised remotely» (http://www.parterre-project.eu/?electronic_town_meeting=1).

ETM (Garramone and Aicardi, 2011) it is a good method to simplify the discussions, voting and to synthesize results: often people discussions are difficult to moderate, compare different points of view. Another benefit of ETM is the feedback of the users: the participants to the project feel themselves like a really authorities.

Registering their opinions and their point of view is important to confer them the appropriate importance: they really see that the computerized system has registered their votes and their ideas, and consequently this fact produces confidence in the state institutions, because it is verified that the govern hears the people's voice.

This is the most important result of the project that we can observe in Palermo: people was proud to collaborate with University and with Europe, and consequently the participation was successfully.

In Palermo there were a lot of other topics related to the project: one of these is that the location of the ETM was in a historical building, the Maredolce's Castle, that is a symbol part of the city. Maredolce's Castle is in a neighbourhood of Palermo called Brancaccio famous for its high level of criminality and for the neglect by public administration for a very long

time: people who live there would a change, a new image of their city, and the historical buildings are for they a possibility to show their cultural and artistic value.

So, the PARTERRE project was for Palermo an opportunity to recuperate values and identity, to dialogue with people, to improve civic knowledge, to confer meaning and importance to the citizen participation. In the 2014 the city s major, Leoluca Orlando, organized a cycle constituted by five different ET Meetings, to improve citizen awareness about city and territory.

3.2 Participated webGIS: local platforms

In the UK there are many experimentations about participation tools, especially about participative GIS. There are local platforms, or also regional or national instruments to m requests, the territorial needs and the political choices.

One significant example is made by Neighbourhood Initiatives Foundation (<http://www.planningforreal.org.uk/>) for the master plan of Slaithwaite, and is a tool to engage the community in local problems of environmental planning. In this case the base map was made by technicians in scale 1: 1000, and exhibited at the event planning group organized on the day of the local fair, crowded with many participants (Carver et al., 2001; Kingston et al., 2000).

The use of a computerized system rather than paper for the map display has allowed, among other things, to control the visibility of comments (made accessible only to the conclusion of the discussion, so as to stimulate the participants ideas and original proposals and creative), and the recording of many more contributions at the same time of similar experiences of Planning for Real. The end result of this process, managed through the web platform (available at: <http://www.ppgis.manchester.ac.uk/projects/.html>), was a new plan of the village that brings together most of the comments from people who live and work in that community.

With this project we have tried to minimize the conflict and to reach decisions acceptable to most stakeholders through consensus-building approaches based on the achievement, by an increasingly large component of the urban population, of a better understanding of spatial implications of the decision making process.

On the web platform <http://www.ppgis.manchester.ac.uk/projects.html> are several projects of this type, such as IntelCities, project funded by the European Community (Kingston, 2007), designed to support and make more open and transparent debate on the theme of space.

This type of system is based on flexible technology of Web Map Server of the Open Geospatial Consortium (OGC), from which provide the base maps (basemap), and supports a variety of spatial data formats including ESRI shapefiles and various raster data formats such as GeoTIFF. It also has functions for the inclusion of additional layers to show geospatial data and significant information relating to territorial policy, which means that you can deploy and change, albeit limited, depending on the particular local needs.

4. Participative GIS: structure, working and potential applications

The focus of my PhD thesis is the participative GIS: the question of mixed methods could be applied to the technical tool, as a GIS, so we can imagine a GIS more flexible and more adapt to describe the social and cultural component of the urban contest.

Actually there are many experimental trials: the researchers are trying to overcome the conflict between the mathematical and quantitative structure of the traditional GIS and the necessity to represent also qualitative social data.

Critical GIS and qualitative GIS are possible (Cope and Elwood, 2009; Knigge and Cope, 2006; Kwan, 2002).

The first trials to realize a GIS more inclusive in relation of qualitative information have produced a multimedia GIS: the map was conceived as an hypertext, linked to photographs, mental maps and other materials. However in this way we have the qualitative information like a later addition, not as a constitutive part of the system.

We need a GIS really inclusive in its structural paradigm, from its original design and not only in the final utilize.

The idea of a participative GIS (also defined Public Participation GIS, PPGIS) is based on the assumption that the data stored in the GIS and spatial analysis tools can give the different groups in society, including various minorities (ethnic, gender), the ability to claim their rights in decision making and planning in the redistribution of land resources.

The idea of a PPGIS could be interpreted as a reaction to the perception of GIS technology as a top-down, technocratic and not inclusive of the interests of social groups involved in decision-making.

The PPGIS is thus basically designed as a tool that works with a bottom-up mechanism, a facilitated technology, strongly characterized in a social sense. It allows users to combine their knowledge, ideas, perceptions, informal and qualitative data, with the official (but not most important) knowledge of the territory about the physical description. So we can have a different interpretation of the value and of the effective location of the geographical elements, because they aren't related only to the coordinates stored in the GIS database, but also to the referencing system.

The idea of a PPGIS is not very recent, dating back to the Nineties, but since then it has expanded considerably and now it constitutes a large and consistent stream of research in the field of geographic information science (Nyerges, et al., 2011, p.350). The fundamental concept is to provide a cartography "deformable" depending on the variables you want to highlight, identifying a display adapted to each typology of variable. In this way the representation of the physical context will not be realized in the same way as that of quantitative variables of social type, and will be different from the mapping of qualitative information.

The process is reminiscent of the old system of overlapping transparencies of McHarg, in which the scholar, aware of the impossibility of reducing to the same numerical scale evaluation different typologies of variables (economical, historical, artistic, environmental, social), attempted to operate comparing, on an experimental basis, restricting himself to draw backgrounds that showed where that variable was more or less expressed, then overlaying transparencies between them, identifying where there was a higher concentration of "value" in a broad sense and where it was this minimum (McHarg, 1989).

Although the experiments in this direction are made for about 20 years, the literature on the evaluation of the real effects of PPGIS in planning practice is not very large. It is fundamental to define exactly what we mean when we talk about PPGIS.

The concept of GIS in public participation is based on the assumption that the geographic data stored in GIS and spatial analysis tools can give to different social groups the ability to represent their interests in the democratic decision-making about the distribution of land resources.

In my PhD thesis I have applied this methodology to an urban context in the city of Palermo, comparing the theoretical issues with the practical context.

5. Case of study: mapping the neighborhood

5.1 The urban context: two neighborhoods in comparison

I have chosen two neighborhoods really different for many aspects: Arenella-Vergine Maria and Albergheria.

The first context, Arenella-Vergine Maria, is an urban district delimited from an administrative point of view: it is the district number 25 in the city of Palermo. It is a peripheral neighborhood near the sea, and the social composition of the population are quite homogeneous, because there are almost exclusively native residents. The condition of the buildings is between good and mediocre, there are only a few examples of evident degradation.

There are some monumental and significant urban buildings, like the Rotoli and the ancient tuna fisheries, a decommissioned chemical industry; there are also natural references like the sea and the beach. These elements are really important at the neighborhood scale.

There are some services, but not enough in relation to the normative standards.

The second context, Albergheria, is not corresponding to an administrative district, but is a part of the historical centre of Palermo. It is a neighborhood in a social sense.

the population is very heterogeneous: there are many foreigners, especially people who came from Africa and Asia. There are also European immigrates, principally they come from East-Europe, but Indians, Nigerians, Kenyans, Ivorians and North Africans are the majority.

The condition of the buildings is really bad, and the public spaces are utilized by residents like an extension of their own houses: there aren't really a public control, so this is considered a social shade zone.

The aim of the experiment was analyse the sense of identity and belonging of the inhabitants in this two urban contexts, and mapping it to express, through the figurative language, the social perception of these places. At the last, the experimental process was repeated using the master plan of these two urban districts, showing the real points of interest for the urban communities, and reading in correspondence the master plan provisions for that places.

5.2 Two different representing methods: manual stretched or automatic deformed GIS maps

To represent the social perception of the urban context, I have utilized the software ArcGIS and I have applied two different methods: a manual stretching of the basemap, in order to a mental map of the same urban area, and then an automatic deformation of the map, using the tool Cartogram.

In the first case, I have realized both an urbanistic analysis of the urban context (size of the area, building typologies, services distribution, and more) and a social analysis using methods like interviews and mental maps (Corbetta, 1999). Then, I have synthesized all the mental maps and the other information in a general mental map, and I have transformed it in a digital map using a common scanner. Finally, I have uploaded it in the GIS software and I stretched the original basemap (raster format) trying to match the points of reference (monumental buildings, landmarks) of the basemap with the same points drawn on the mental map. I have used the tool georeferencing to this aim: in this way I have changed not only the position of each point but also the whole referencing system. I have passed from a quantitative referencing system to a qualitative elements frame. The use of the georeferencing tool is theoretically significant in this operation (fig.1).

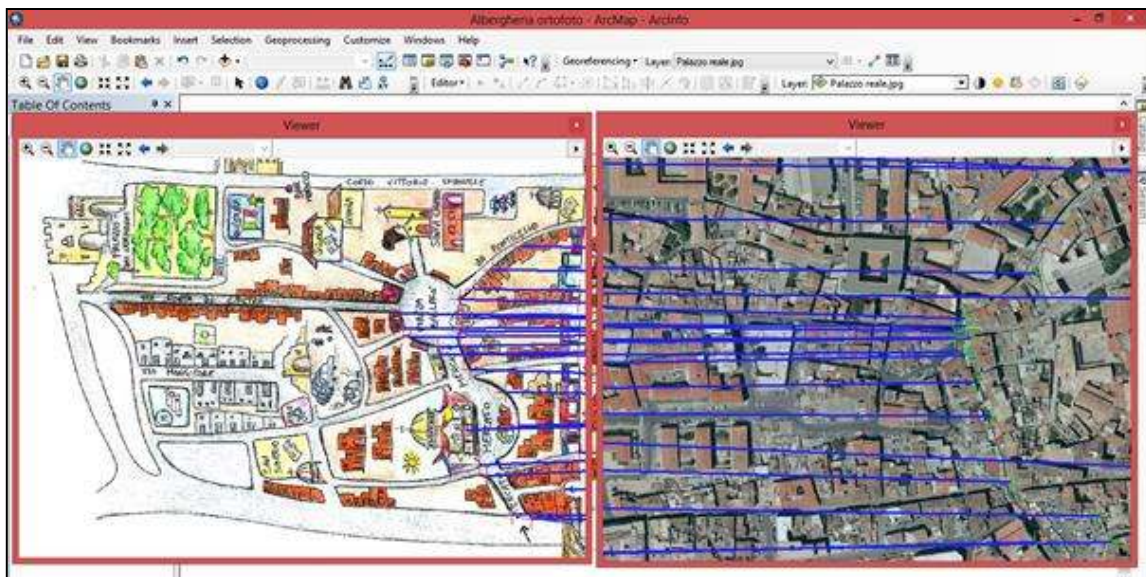


Figure 1. Georeferencing of basemap in relation to corresponding mental map.

The second method has a different process: after a qualitative survey about the social context, I have categorized the information in a table, and I have determined a value scale based on the frequency of the people's answers about the public spaces, the neighborhood landmarks and more. After this operation, I have attributed a numeric value to each important

spatial element of the urban area, and I have selected a vectorial basemap (a shapefile of the urban area), because the applicative tool works changing the areal size of polygons.

Cartogram has been realized by two researchers, Gastner and Newman (U.S.A) substantially an algorithm finalised to resize the States of the world in relation to their population and not for their areal extension, like in the fig.2

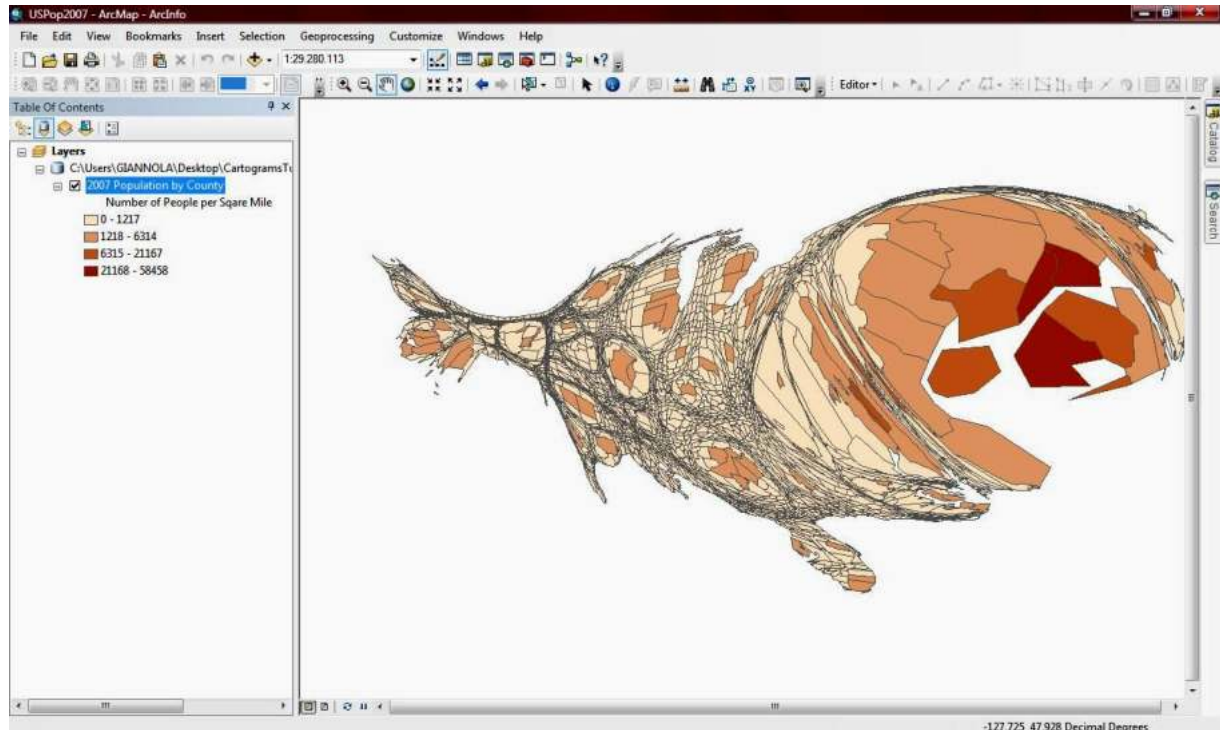


Figure 2. Demonstrative example of the Gastner and Newman's method

Cartogram it is designed to represent an approach to geography less physical and more social. It intends to enhance in the representation not the size of the territories in terms of area but the amount of people living there. In this way, as the data is still considered quantitative, scholars software authors have drawn attention to the "human" component of the territories studied, emphasizing that the presence of the inhabitants is the key element of a territory (Nyerges et al., 2011). It is certainly a big step forward in the relationship between geography, technical planning and human sciences, but it is still a partial point of view: for example, it environmental ecosystem in which man lives at the same level of importance of the amount of people who focus in it.

The definition of the fundamental criteria of a similar system of representation is therefore subject to the particular type of analysis to perform, and certainly a system of representation does not exclude the other, in view of a study as much as possible inclusive and integrated.

Comparing the two methods, the first (manual stretching) result more adapt to represent our objective: the automatic method presents some technical difficulties to apply projected for very extended geographical areas and not for little subdivisions of an urban district. Another problem is the necessity to force the qualitative information to become a quantitative datum: the choice of the value scale in that case present some critical points about the propriety of the method.

5.3 Results

At the end of the GIS processing the map has been deformed: the points of interest are more extended, some areas are stretched and some others are compressed.

This deformation has been applied in the same way to the master plan: the extension of some specific urban areas corresponds to a more deep perception of them by the inhabitants. In the fig.3 we can observe the deformation of a crossroad, called Ballarò square : in the perception it s really a large squares, because is a very important point of referer residents know.

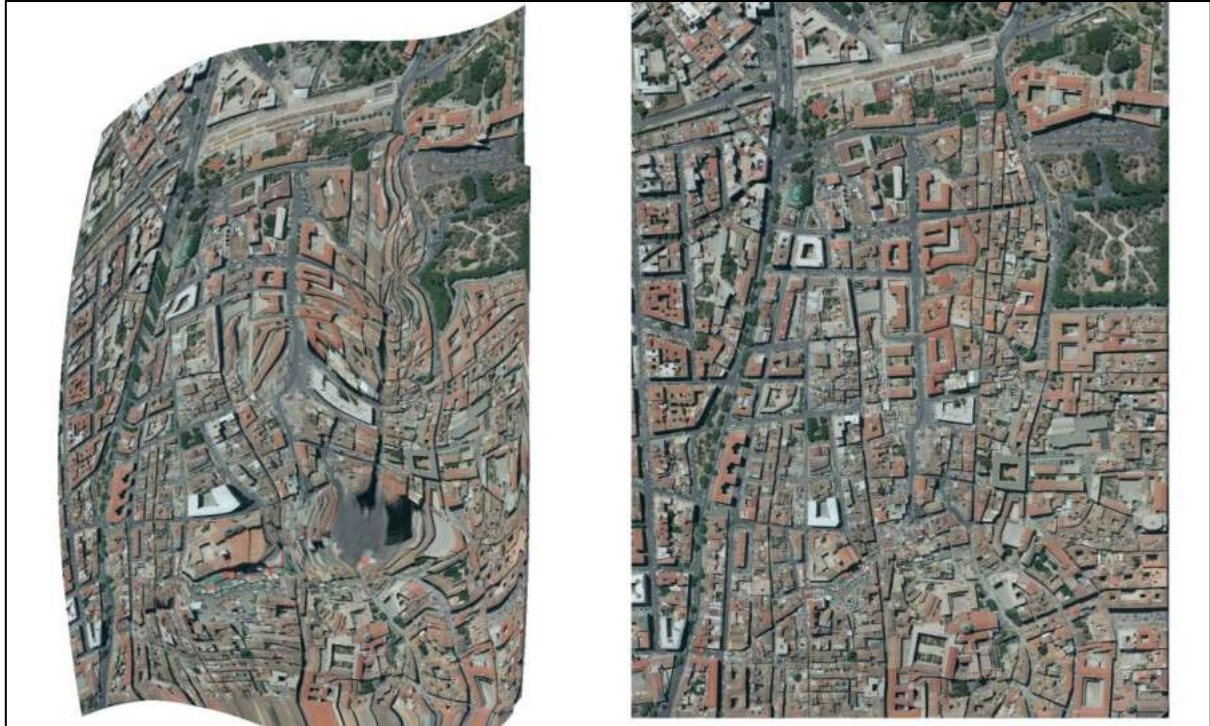


Figure 3. Comparison between deformed and original map of the Albergheria neighborhood.

The importance of this place derives from the fact that it is a place crossed to go through several directions, in each of which there is a reason of interest. To the left (south) there is the market of Ballarò; always in the same direction, the central train station; down (to the east) there is Via Maqueda, a very important commercial urban axis, where the services are focused on education (Faculty of Law) and the city administration (Piazza Pretoria and the Town hall of Palermo); on the right (north) we find the accommodation centre of Santa Chiara, and subsequently Piazza Bogni, until you get to the axis of Corso Vittorio Emanuele. Finally, on the top of the map (west) there is the Norman Palace, the police station, the public garden of Villa Bonanno, the connection to the railway station Orleans, the University campus. We can define the square Ballarò as a centralizing element of movement. We can see clearly the non-linear paths, except for a few main lines. We can note the high building density of the Porta di Castro street, where the buildings seem to thicken, and the spaciousness of via Mongitore (both in East-West direction), which also ends in a square just before Ballarò square (really it s now an empty space used for parking, where children play football and where they accumulate bags of uncollected rubbish).

In the masterplan, this focus point corresponds to a lack of planning. The master plan for this area in fact provides only that the streets are driveways: it doesn t consider pedestrians, is not given the right importance of this point as a landmark and as a sign of identity and recognition of the district.

6. Conclusions

The integration between the computerized map and the intuitive representation of mental map, and then the integration between the quantitative data and the qualitative ones, has determined a hybrid representation, a computerized map "deformed", expressive of both points of view.

The product obtained is an example of what could be accomplished by applying a mixed methodology of analysis (Elwood, 2010; 2011).

The fact that the deformation is made through georeferencing assumes an important meaning: working in this way we force the system of geographical coordinates in which are located the points we have moved manually on the map. We use a command that has already another specific function, that belongs to a logical system completely different. The points have a position in the space, as well as physical objects have a shape, but there is a big difference between the position detected by instruments and the position that is perceived by the people, and it is the same for the shape. The GIS is an instrument designed to represent and calculate points and coordinates referred to a geometric grid recognized globally as valid, so doesn't have tools that allow to track other types of representation.

We can interpret the use of geo-referencing as a tool for "deny" the officially recognized position of each point in different ways: it is a forcing, denoting the need to further develop the instrument; it is also an innovation to enable GIS to contain more cartographic records; to make GIS a multidimensional instrument; Finally, it is a provocation, finalising the ethical question related to the choice of a single system of representation and to the consequent exclusion of other systems that could instead be recognized as equally valid.

The disciplines involved in this work are at least three: Planning, Social Sciences and Geomatics. For the Social sciences the topic more interesting to develop is the social justice, which concerns the democratic nature of the instruments of government (in this territorial governance), the transparency of operations carried out (the accessibility of web platforms encourages the social control on policies that are implemented by decision makers) and the inclusion of all elements of society in the territorial context. The social justice encourages a dialogue, moderates the conflicting, takes account of the needs, expectations, collective wishes without discrimination or marginalization. To do this it is clear that the digital tools are not enough, because Internet and ICT have limitations related to: however PPGIS can be a valuable support to the participatory process, properly used and integrated with the traditional practices of participation offline.

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