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Understanding the Added Value of Rooting Geo-technologies in Planning Practice: The "Intramural" Case Study in Jerez de la Frontera, Spain

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While planning practice largely relies on conventional planning methodologies, academia is ahead on the research about geotechnical tools such as Planning Support Systems (PSS) and how they could support contemporary and complex planning processes. The aim of this paper is to show the outcomes of the application of geo-tools (i.e. Geographical information systems) in an empirical case carried out by practitioners, academics, and the Municipality of Jerez. It draws on empirical data from a planning project focused on the dilapidated and oldest area in the city centre. This area is collapsing due to lack of maintenance and lack of inhabitants. The project created an urban indicator framework, to determine the agenda and priorities for urban development projects implemented in the area. It is a quantitative approach and distil what could be done to ameliorate the situation. This paper promotes aims to reflect how PSS can be appropriated in a specific planning culture. The goal is to find which are the crucial urban indicators and which are the added values found during the implementation of PSS during the process. It concludes by emphasizing the valuable contributions of empirical case studies to better understanding the added value of PSS in planning practice. It reflects on the demand to promote tailored PSS applications in order to adapt to local planning methods and theories.

Keywords: Planning practice, geo-technologies, planning support systems, urban vitality, urban indicators, geographic information systems.

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Towards a More Contextualized Planning Approach

Contemporary planning approaches have to address a wide range of complex issues in cities. Methodologically, in order to address that complexity, a city planned from a more bottom-up approach is the one that pretends to read not just the global agendas but also the local demands. Indeed, several planning practices have found the collaborative planning approach a way to methodologically approach the challenge of complexity in a democratic way. They aim at providing plans that take into account the local demands taking place in our contemporary cities (Goodspeed, 2016; Healey, 2003). The collaborative approach promotes a dialogue between diverse actors with different interests in order to achieve an inclusive city where everyone could have quality of life. However, collaborative planning is not chosen by many practitioners from contexts like south Spain.

This paper reflects on the applicability of Planning Support Systems (PSS) in a collaborative planning approach, by examining how GIS and an urban indicator framework perform during the elaboration of an urban project plan in a specific planning culture situated in the south of Spain. PSS such as GIS, geo visualizations, and urban simulations are being implemented alongside conventional planning approaches as a supporting tool rather than as a tool that dominates the planning exercise (imposing data-driven solutions with no understanding of the qualitative side of urban problems). This promotes more the approach of a collaborative purpose, understood as a process where diverse stakeholders are considered during the decision making process, in the urban plan elaboration process.

PSS' technologies provide a quantitative and rigorous reading about the physical aspects and living conditions of the area by processing a considerable volume of data. However, by combining technology and conventional planning methods, the result is a process in which the main concerns are not the outcomes but the focus is set on improving the process towards deriving these outcomes. The focus is then towards promoting a collaborative approach bringing together diverse stakeholders and promoting potentially more inclusive outcomes from planning practice.

PSS can be considered as a theoretical tool without any practical application, the ambiguities in its definition being discussed by authors like Harris, Batty, Klosterman, Vonk, Geertman, Toppen & Stillwell, among others, who do not succeed in discouraging us from our alignment with Portugali's claims in that PSS emerged from the need to support a collaborative planning process, considering the aforementioned tools as a support to establish a more collaborative decision-making process when compared to classical planning.

Planning Support Systems, are defined by Portugali (2011) as the combination of Geographic Information Systems (GIS), virtual reality and urban simulation models. Becoming prominent in the 1980s, PSS were seen as a powerful solution for enhanced implementation of technology into planning exercises (see Harris, 1989) However, these tools are not without their critics: several academic studies have examined the usability and usefulness of PSS in collaborative processes to determine their specific contribution to planning practice (Pelzer, 2015; Te Brömmelstroet, 2016; Vonk *et al*., 2005). Those authors identify a number of reasons as the cause of their professional rejection: the exclusively technological orientation in understanding the urban problem, their rigidity, the absence of a user-friendly interface and their universal character. Other authors, among which Geertman and Stilweel (2004), who state that "the state-of-the-art in terms of the adoption of PSS and their real contribution in practice has remained uncertain" (p.292), and Vonk (2006), among other, conclude that, despite the fact that PSS have not been applied in practice, professionals still require and

request support in their everyday challenges due to the growing complexity of the planning exercise.

The tool that allegedly operationalizes the application of the theory of convergence is sorely lacking in the professional life. Despite technological advances, we continue to struggle for ways of implementing them in practice. And this is a research question which is tested in the empirical case explained in this paper.

The fact that the tools are shaped differently in every planning culture and ultimately produce different outcomes demands a review of how they perform in multiple planning cultures in order to observe patterns of usability, usefulness and performance of PSS supporting and facilitating diverse planning methods worldwide. Such observations of how diverse planning cultures appropriate PSS are crucial for enhancing the understanding of the role of technology in supporting planning practice.

This article examines PSS implementation in a planning exercise carried out with the Municipality of Jerez de la Frontera in southern Spain, to develop a planning process for Intramural, the oldest area within the old Almohad city walls. As the oldest and heavily rundown area of the city, it has been the focus of numerous planning interventions during the last 30 years. Our exercise is an attempt to test approaches based on rooting technological tools in a specific planning culture in order to understand whether they add any value to current processes. The “Intramural Process” was developed in two main phases: 1) *Urban Diagnostic Document*, developing an urban indicator framework through GIS and database analysis, providing a novel reading of the current state of the area; and 2) *Public Participation Process*, a public exhibition showing the outcomes of the diagnostic analysis as well as several public activities aimed at formulating a collaborative conclusion on the state of the area.

The article is structured as follows: Section 2 outlines the outcomes from the two phases developed under a real case on a planning process situated in Jerez de la Frontera. The first phase encompassed an analysis of the area using GIS and databases, while the second phase analysed the application of visualization tools and their role in facilitating enhanced understanding between key actors invited on focal groups during the open exhibition. Then, the paper reflects on the question of to what extend can PSS improve the existing planning approach in the specific case of southern Spain.

The role of Geo-technologies in the Analysis Stage of Planning Practice

In the analysis stage, the practitioners (planning and urban design companies elaborating urban plans) sought to develop a planning document called “Urban Diagnosis”, capturing the current state of the area and mainly related to its physical conditions and the most urgent interventions. This process utilized: 1) a *multilayer* method, combining urban indicators to understand the interconnectivity between urban issues (such as lack of inhabitants, collapsing buildings, lack of maintenance of public space, so on); and 2) a *multiscale* method, analysing the main five scales of the Intramural area (one district, five census areas, 16 sectors, 100 blocks, 953 plots). The block dimension was the most-analysed scale because at this spatial unit the urban indicators analysis produced the most relevant outcomes and, historically, the block has always been the main urban unit related to the separation between public and private space.

This phase used mainly GIS technologies linked to a database from the Municipality and other institutional sources. All the gathered data were processed to generate an urban indicator

framework composed by a set of indicators developed by the practitioners in order to measure quantitively the status of the area.

Urban vitality as indicator to understand liveability in southern Spanish cities

Instead of the conventional planning approach, based on making a simple differentiation between residential and non-residential land use, our approach studied the performance of urban vitality in the area. Urban vitality can be defined along Montgomery's (1995: p. 97) approach:

"Vitality is what distinguishes successful urban areas from the others. It refers to the numbers of people in and around the street (pedestrian flows) across different times of the day and night, the uptake of facilities, the number of cultural events and celebrations over the year, the presence of an active street life, and generally the extent to which a place feels alive or lively. Indeed, successful places appear to have their own pulse or rhythm, a life force or *elan vital*. But this can never be taken for granted, as there are now many examples of previously lively places which have become dull and inert."

Following this definition, we analyzed urban vitality in Intramural areas through the combination of three data types. First, land-use distribution was collected from the land register, which defines land-use by plots grouped as either residential or non-residential. The residential built-up area was 61.10% of the total Intramural area. Second, the census data from the National Statistics Institute of Spain (INE) showed that 42.46% of the built-up surface had no inhabitants, thereby demonstrating the issue regarding the lack of urban vitality. Third, water consumption data was collected from the public water company, indicating water consumption volumes by blocks per year. It defined the level of urban vitality of the residential built-up area without water consumption at 19.53%, meaning there is a significant percentage of built up are not consuming water showing the lack of urban vitality indicating that there are no people using these areas. With this information (water consumption in non-residential functions) it was also possible to calculate the vitality of non-residential land-use. Indeed, 24.27% of the built-up surface characterized as non-residential was inactive (with no water consumption), again pointing to a lack of general vitality in the area.

This input was decisive for the entire planning process. Usually conventional planning just gets to read the physical and static side of cities (i.e., maps of built up area distribution, population distribution, heritage protection, so on). However, and by the support of GIS tools, this experiment showed that the dynamics and more vital area of cities can also be seen from a quantitative point of view promoting an additional metric for measuring vitality of use in the area.

This provided for a shift in focus in the elaboration of indicators, highlighting that the issue at hand is not the bad physical state of the buildings, but rather that due to strong tendencies of depopulation some sections of the area are not inhabited, further worsening building maintenance. This shift means that the technological tool added value in terms of content but, more importantly, also shaped the internal dynamics between practitioners. It showed how intuitions could potentially be proved or refuted by advanced quantitative analysis and that with conventional tools could not be addressed.

To understand the value of the urban vitality indicator as one of the main outcomes of the analysis, a deeper understanding of the relationship between vitality and built-up space was needed. To tackle this challenge the team developed the "level of unoccupied" indicator (Table 1), by combining the three layers mentioned above (land-use distribution, census data, and

water consumption). This indicator had four levels for residential land-use (unoccupied, underused, badly occupied, well-occupied) and two levels for non-residential use (active and inactive).

Table 1. *Level of vacant space in the Intramural Area.*

LAND-USE	**RESIDENTIAL**				**NON-RESIDENTIAL**	
Level	Unoccupied	Underused	Badly Occupied	Well occupied	Active	Inactive
Parameters (person by built surface) Water consumption (yes or not)	0 person by plot	< 65 m^2	35–65 m^2	>= 35 m^2	yes	no
RESULTS by built surface	**19.53%**	**60.27%**	**13.51%**	**6.68%**	**75.73%**	**24.27%**

By aggregating and averaging the figures for all underperforming areas (unoccupied, underused and badly occupied from residential and inactive from non-residential) they concluded that 79.88% of the total built-up surface of Intramural could benefit from interventions to improve use vitality. Therefore, the usability of GIS as integral part of a PSS was crucial in order to be able to understand the overlapping of the diverse indicators formulating the values of urban vitality.

The relational framework of vitality through urban indicators. The case of Intramurals.

In this section and through the understanding of interrelated indicators to urban vitality we aim to explore the added value of technology within a complex reading of an urban issue. To be able to intervene in a successful way in an urban area, it is important to understand the past intervention analysing its successes and failures as a way to avoid repeating mistakes. In the case of Intramurals, after thirty years of public intervention, the indicators still show a lack of urban vitality.

The demographic comparative study of Jerez's and Intramural's population for the period 1960–2013 highlighted the population decline in Intramural, implying weak impacts from the building renovation work carried out by the public administration in the area. During the same period, Jerez de la Frontera as a whole saw continuous population growth.

Around 1960, the Intramural area comprised 11% of the total population of Jerez, declining to 2% in 2013. This outcome can be explained by the socio-economic drivers behind the demographic trend, roughly divided into two periods. The decades between 1960 and 1980 are marked by a sharp population drop, decreasing from 13,813 to 6,261 inhabitants. The three main potential reasons behind the sharp decrease in population numbers are: 1) the new housing city growth model, which developed several hectares of new urban development at the city's periphery; 2) the industrialization of the wine production, concentrated in the Intramural area, and its subsequent relocation to the city's periphery, promoting employees to move out of the historical centre to the new suburban areas; 3) the car-centred city growth model, which incentivized relocation to suburban areas (as part of the suburban trend in most of the cities during the 60s).

From 1980 to 2014, Intramural's population has remained largely constant at around 5,000 inhabitants, roughly one-third of the population size in 1960. Since 1980, the Municipality has sought to counter the critical state of the Intramural area with a package of public construction interventions. According to the urban diagnosis document, half of the built-up area (50.43%)

has been renovated to date. While it clearly had the effect of halting the exodus out of the area (i.e., maintaining stable population numbers), it did not succeed in attracting new residents to Intramural.

In order to quantify the lack of success of the last thirty years of urban interventions so as to bring back the urban vitality that the area demands, an analysis was developed which combined two urban indicators: “level of unoccupied buildings” and “level of building intervention”. This revealed that 52.93% of the unoccupied buildings had benefited from interventions during the past 30 years. Despite the large share of renovated built-up area, occupancy figures for the area still fall short of its maximum capacity (Figure 1). The combined analysis of different data streams demonstrates that the future performance of Intramural is not only connected to physical or spatial interventions but also to specific measures that will attract people to live in it.

Moreover, more than one-fourth (26.44%) of the built-up area is in bad physical state. This percentage is classified as high and alarming, especially when one considers that the share of buildings in bad physical state should be less than 5%. However, it is important to understand that the physical space also has a social dimension, which can be analysed by combining the urban indicators “condition of the buildings” and “number of people living by plots”. This analysis shows that 17.90% of the population lives in a building of bad physical condition, which is correlated with the high level of vulnerable population in Intramural. Therefore, if people do not live within the built-up area there is no one to maintain it, even more as regards the historical centre where the built heritage is more expensive and requires more time to be rehabilitated.

Since this area is the city centre and the origin of Jerez de la Frontera, it has a very high share of structures (69.50% of all plots) under protection as historical heritage by the national, regional and local government. By combining this indicator with “level of unoccupied” and “physical condition of buildings”, we found that 70.92% of the unoccupied built-up area has the status of historical heritage protection, indicating the population’s low interest to reside in high heritage protection level plots. In addition, 38% of the heritage plots are of bad physical condition. This situation generates several contradictions and also debate related to the level of protection and whether it delivers the desired results or it is indeed promoting lack of maintenance within the built-up area. Following the outcomes, the higher level of non-occupancy is protected the most, and more and more people leave, the worse the physical state of the building turns. These correlations show that interdependencies between urban indicators (see Figure 1) should be carefully considered before designing potential solutions.

Regarding the diversity of functions as a pillar promoting urban vitality, we discovered that the entire Intramural area, non-residential land-use makes up 38.90%, from which roughly one-third (32.64%) is public facilities. This figure is divided into either public (44.28%) or private (55.72%) facilities – understanding public facility as a plot owned by national, regional or local government. Public facilities provide support to residents as part of the public administration and provide two types of services, at the level of the entire city and at the neighbourhood level. One would expect that Intramural, as part of the core city centre, is home to several public facilities that service the city as a whole, which totals 39.86%; however, it is surprising to note that only 4.11% of public facilities provide support to the neighbourhood. From the entire share of private facilities 76.91% are religious land-use, but many plots are empty or inactive. The lack of facilities which provide services to neighbourhood level and the unbalance between public-private ownership of publicly used facilities, city-neighbourhood services are increasing the lack of attractiveness to bring inhabitants into the Intramural Area since they do not feel

there are enough facilities to have a good environment to live in (based on several newspaper statements from the community of inhabitants in the area).

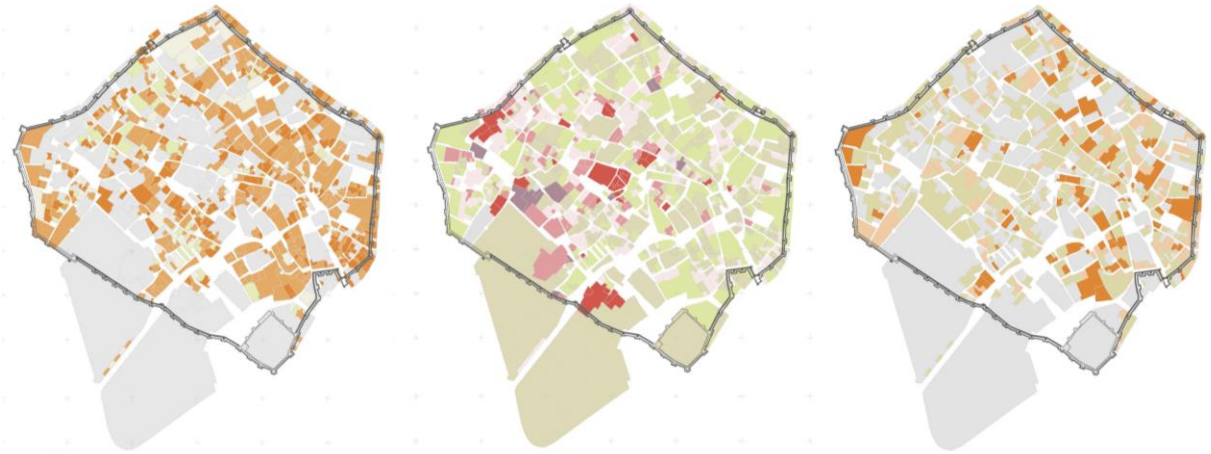

Figure 1. *(1)* Level of unoccupied, darker the emptier (left), (2) Level of building state. Red bad physical state (centre), (3) Level: intervention + unoccupied (right). Source: Compiled by the authors in 2014.

Besides the built-up analysis of interrelated indicators to urban vitality, the public space can also potentially be analysed since it is part of the duality to generate urban vitality. Intramural is characterized by high built-up density and intensity of use. The public space is full of parked cars that block pedestrian spaces, highlighting another important issue for liveability and vitality. Intramural is not a pedestrian area per se, but the city centre and its urban fabric are not suitable for cars, leading to conflicts between pedestrians and cars. The analysis carried out calculations by isochrones to examine the potential for creating a more pedestrian-friendly environment. The physical distance between the two most distant points in the area is less than one kilometre, easily walkable in 5 to 10 minutes. However, this demands an understanding of the social position of the inhabitants in the area. There are two opposing groups: 1) those who support improving the walkability of the area (the majority are residents of Intramural) and 2) those who advocate for additional parking infrastructure the people (most are private companies as well as the municipality).

Therefore, the lack of urban vitality worked as an indicator allocating complexity of the urban performances such as: the lack of success on policies protecting heritage which led to lack of attractiveness to people to live in the centre. This is because of raising of the rental prices due to speculation happening in city centres regarding tourism, combined with the high degree of maintenance that is needed to preserve the built environment. The intense level of physical interventions is not framed in any strategic plan, therefore, getting lose in the mass of issues regarding the lack attractiveness and without a coherent or strategic vision of where to go. These indicators were generated thanks to an intensive use of a database linked to a GIS platform for Intramural area. These tools supported the planners in order to be able to find out themes, standards and patterns going deeper on the issues of the area beyond just a vectoral reading of the city. We could read and interrelate alphanumeric attributes that helped to articulate a more complex reading of Intramural´s issues.

From the lack of attractiveness towards framing opportunities in Intramural

As noted above, in 2014 the area had 4,912 inhabitants, compared to 13,000 in 1960, indicating a structural problem for maintain urban vitality. Taking into account the already bad

conditions of the housing patterns in the 1960s, one cannot expect a return to such high occupancy levels: however, it is clear that 5,000 inhabitants cannot maintain urban vitality in the area either. According to the document elaborated by the planners based on the urban indicators' analysis, it resulted that more than 300,000 m^2 of residential built-up space are available. Based on the coefficient of contemporary densities on historical centres based on historical studies within the area and similar city centres in the context of south of Spain, the realistic scenario for additional residents would fall between 5,000 and 6,200 people. In other words, Intramural is currently at only 50% of its capacity, which was interpreted by the actors involved in the diagnosis as an opportunity rather than a problem. This was seen as an opportunity for elaborating a different planning strategy in southern Spanish planning culture – to revitalize the core city rather than keep urbanizing the rural surroundings. This could be easily visualized in a simple calculation, based on the calculation the developers of the urban plan proposed during 2015, highlighting that investing in Intramural instead of in new urban developments in the outskirts would save 150 hectares of additional land consumption. This conservation would reverse the current urban planning trend in Jerez de la Frontera city and provide a best practice for the entire Andalusia region, which is marked by urban sprawl trends rather than densifying the existing built-up environments in cities.

Sharing the outcomes, changing dynamics and trends of interventions in Intramural

The main purpose of the participatory process was to discuss and share the outcomes of the intense PSS-based relational analysis of space described in this article. Therefore, the whole process focused on the question about how to bring more urban vitality in the area, which helped to integrate and coordinate the complex participatory process carried out. The question explored was: How to increase the resident occupancy the Intramural? (Figure 2) Two activities provided the format to generate wide public participation and discussion of this complicated issue: 1) a public exhibition as the space for interaction (discussed below) and 2) public activities about the outcomes of the diagnosis document with focus groups.

Figure 2. Inhabitants' community meeting. Source: Compiled by the authors in 2015.

The public exhibition "DNA Intramural": explaining the quantitative side of lack of urban vitality

The DNA exhibition served two main goals: 1) to present the main outcomes from the first analytical phase and 2) to gather inputs regarding Intramural's problems and opportunities from the its inhabitants as well as the citizens of Jerez:

1) Sharing the results from the diagnostic study: The area outside the meeting room was filled with all the quantitative conclusions, illustrated as maps, statistics, images and texts.

The materials highlighted the aforementioned urban indicators. The dialogue carried out was mainly based on aiming to communicate- from a quantitative approach- the lack of urban vitality in the Intramural are. Also, was explained that the lack of urban vitality had causal relations to many other issues taking place in the area i.e. Heritage protection level, level of interventions in the last 30 years. To engage with the local community, we developed four guided visits to the exhibition as an aim to support key actors in the process of understanding the added value of our analytical approach, which combined physical and social aspects of Intramural.

2) Gathering stakeholders' inputs: The active contribution session took place inside the meeting room of the community centre, via a facilitated discussion. The session consisted of several parts. First, a SWOT analysis defined by keywords provided by designers was filled out by the visitors of the exhibition on boards on the wall. In a second step, we approached the results of the SWOT analysis in a more interactive way and made it speak more directly to the diverse types of audiences. Second, a map of the area invited them to mark their favourite places and provide comments. Each participant was free to draw and/or write whatever they felt after seeing the whole exhibition. The third participatory tool was a map about participants' memories of Intramural. This map was filled by points expressing a specific location on a big map of the area which had attached a note. It showed a mapping of those areas identified most within Intramural, seen from the viewpoint of exhibition visitors/ participants. This means those were the favourite spots for the participants. The diverse groups participating tended always to locate their favourite spots in similar zones within the area studied. Therefore, either all the participants belonged to same community with similar spatial dynamics, or those areas had enough attractiveness to bring people together. This shows the importance to invite diverse communities to an integrated process. By using the same/ similar methods the organizers were able to reach out to the diverse groups within the area. The fourth tool was an empty wall to be filled with photos, texts, objects (whatever the participants wanted to place there), about all the events (cultural, art exhibitions, guided visits to the exhibition, interview with specific inhabitants, etc.) generated outside of the exhibition's location. This step revealed a lot of different activities as well as the diverse backgrounds of the persons involved in public participatory process.

The public activities about Intramural area

Two strategies were employed to generate public interest in the events: 1) activities around the DNA exhibition, designed to spur the interest of diverse actors involved in the process, and 2) activities embedded through cultural events to engage people from other neighbourhoods of the city in the Intramural Planning Process. Both strategies helped to obtain a varied perspective on different interests of the inhabitants of Intramural as well as encourage resident engagement throughout the city to jointly determine the desired future pathway of the area.

1) Activities around the DNA Intramural exhibition were based on promoting visits during the entire month of the exhibition, guided by planners. Discussion sessions with elderly inhabitants were combined with a debate with decision-makers and diverse experts about the conclusions from the urban diagnosis document elaborated from practitioners. Activities that focused on families were based around leisure activities in different private and public spaces of Intramural.

2) Activities to attract citizens from Jerez were based on cultural activities related to use private dwellings of Intramural inhabitants to create a cultural route attended by a wide range of diverse actors (inhabitants, cultural organization committees, politicians, experts,

population out of the area, etc). This type is called “redetejas” (translated from Spanish as a network of rooftops) and it is a national initiative to promote private spaces as a potential space to host diverse cultural activities. Also, we organized a cultural exhibition on the Intramural area, displaying works by artists from various countries, complemented by facilitated public discussions.

The outcomes of the participatory process

The series of activities and physical interventions produced during those three months of participatory process promoted a change in the debate about the area. Before all the process about urban vitality analysis started in Intramural, the discussion between decision makers and inhabitants had always been based on the dilapidated physical state of the built-up area. However, due to the use of geo technological tools and a deeper understanding of causal aspects referring to the lack of urban vitality as the cause of that dilapidated physical state, the decision makers were able to reflect on the way of intervening of the area. They opened a discussion towards a more social driven intervention rather than just purely physical intervention. This was important since it alleviated the tensions between inhabitants and decision makers, promoting a debate about priorities and strategies. Both actor groups used the insights (data and analysis) as tools to discuss amongst themselves. This caused a change of trends and dynamics not just in the way of intervening, but also using the outcomes as a vehicle to generate discussions about the future of the area.

Discussion and Directions for Future Research

The two main goals of our research were: assess implementation of geo technologies in planning processes, and to understand how PSS can be adapted to a specific planning culture. The idea that PSS improves planning practice *per se* has been analysed in this paper, revealing that it is not only about technology in itself but how, when, why and mainly with and for whom it is used. This means that depending on the existing planning procedures rooted in the specific planning culture, the collaborative approach takes different shapes. Therefore, the role of PSS will be different as well. In this case, it proved useful when generating new, detailed quantitative analyses, enabling a more targeted discussion of the issues of the area (specifically the issues of urban vitality), while in the participatory process the technology was not needed at all since the participants were demanding a more analogue interaction with the maps and SWOT analysis. The more accurate analysis and possibilities to understand the more performative side of cities (such as the analysis of urban vitality) helped to understand how potential interventions could be more tailored to local demands of a specific context. Therefore, the combination of two approaches helped create awareness among different actors and decision makers. On the other hand, the qualitative process was developed through the use of more participatory and rooted tools to be able to communicate the change of trends in the area.
The core academic reflection from this empirical process is that research should not seek to modify planning procedures and methods in order to achieve technological implementation, but rather focus on adapting their technology to the specific demands from practice. In other words, there is a need for researchers to develop strategies on how to integrate available technologies within current planning practice methods and procedures. This approach makes sense if the specific planning culture is open to implement those issues, therefore before thinking on PSS implementation, it is essential to understand what type of planning context is given and whether it has included and normalized in its process the openness to geo technological tools. The main concern is not how to find a universal role for technology in current planning practices but to understand the demands of local planning culture and then select the most suitable tool/method for the methodological challenges practitioners face.

As demonstrated by the case of Intramural, the PSS was useful in so far as the technologies used in the processes were flexible enough to be adapted to the specific practitioner's context based-challenges. The tool proved to be useful and improved the planning analysis because its role was to support a planning process based on a collaborative approach. The goal was not only to provide quantitative data of the area's features but to facilitate discussions among all key stakeholders on potential intervention strategies. On this vein, practitioners will be more aware of local demands, decision makers would have to commit to inhabitant's needs, and generally joining the collective knowledge the potential results might have higher chances to be successful.

The PSS deployed in Intramural allowed practitioners to understand not only the physical features of the city but also to work with the concept of urban vitality, a method for studying the urban dynamic/urban life along with the static features of the urban fabric. In this sense, the modelling process of the simulation is essential to relink the disconnected relationship between planner and citizen. This method encourages better communication process between diverse stakeholders, affected groups and individuals and decision-makers. Future research and experiments of implementing urban simulation as the last phase of the Intramural masterplan process could promote a different communication process between experts and non-experts in the decision-making process. This approach provides a valuable step towards promoting the idea of "the city that plans" (UN Habitat, 2016) and a more open and inclusive decision-making process supported by technology.

References

Geertman, S., & Stillwell, J. (2004). "Planning support systems: an inventory of current practice". Computers, *Environment and Urban Systems*, 28(4), p. 291-310. DOI: https://doi.org/10.1016/S0198-9715(03)00024-3

Goodspeed, R. (2016). The death and life of collaborative planning theory. *Urban Planning*, 1 (4), 1-5. DOI: http://dx.doi.org/10.17645/up.v1i4.715

Healey, P. (2003). Collaborative planning in perspective. *Planning theory*, 2 (2), 101-123. https://doi.org/10.1177/14730952030022002

Montgomery, J. (1995). Editorial Urban Vitality and the Culture of Cities. Planning Practice & Research, 10/2, 101-110. DOI: https://doi.org/10.1080/02697459550036649

Pelzer, P. (2015). Usefulness of Planning Support Systems. *Conceptual perspectives and practitioners' experiences. PhD Series In Planning, book*, *3*. University of Utrecht.

Portugali, J. (2011). *Complexity, cognition and the city*. Springer Science & Business Media.

te Brömmelstroet, M. (2016). PSS are more user-friendly, but are they also increasingly useful?. *Transportation Research Part A: Policy and Practice*, 104, 96-107. DOI: https://doi.org/10.1016/j.tra.2016.08.009

Vonk, G., Geertman, S., & Schot, P. (2005). Bottlenecks blocking widespread usage of planning support systems. *Environment and planning A*, 37(5), 909-924. https://doi.org/10.1068/a3712

Vonk, G. A. (2006). Improving planning support: the use of planning support systems for spatial planning. KNAG/Netherlands Geographical Studies. (PhD Dissertation).