SMALL OPEN SPACES. LIVEABLE SPACES

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ABSTRACT

This paper aims at evaluating the morphological and land use characteristics of two villages, Obidos and Palmela. The key objectives are to better understand the interactions between public space characteristics and urban liveability. The main questions are the following: Are the morphological characteristics able to influence the potential liveability of a public space? What are the spatial factors that contribute to strengthen urban dynamism?

The current methodology used the variables of integration, control and connectivity to analyze their correlations and understand the formal logic of the urban network, in what concerns the emergence of centralities and open spaces.

This paper concludes that public spaces located in strategic areas can take important advantages from their location, through the improvement of public space design and the encouragement for the location of economic activities able to improve liveability in outdoor spaces.

1 INTRODUCTION

The concept of urban centre is related to the different economic activities and their spatial distribution (Chiaradia *et al*, 2009). The centrality of a public space is therefore determined by the measurement of the urban socio-spatial dynamics, knowing that this is a process always in transformation and dependent on spatial and social factors (Krafta, 2008; Serdoura, 2006). An urban space which has a centrality profile can be a dynamic place, demanded by the different economic activities and where urban life naturally emerges (Serdoura, 2006).

During the last decades, urban centres have been subject to several changes, as many of them have emerged, expanded, shrunk, shifted, diversified, specialized and even disappeared.

The case study focuses on two small villages, Obidos, in Costa da Prata region, and Palmela, in Lisbon Metropolitan Area, in order to analyze the specific dynamics of urban fabrics which coexists with a lack of social and economic dynamism and a decadence of urbanity and liveability of the public space. The street patterns of both villages retain the layout of the original medieval settlement. Nowadays, as a consequence of a lack of urban regeneration strategies, their public space is losing its liveability. Particularly in Palmela, the housing developments that were built in the 90's don't seem to be coherent with the pre-existent urban fabric, which led to a gradual loss of social and territorial cohesion.

This paper aims at evaluating the morphological and economic characteristics of these two small towns. The key objectives are to better understand the interactions between public

space characteristics and urban liveability. The main questions are the following: Are the morphological characteristics able to influence the potential liveability of a public space? What are the spatial factors that contribute to strengthen urban dynamism?

The analysis of these towns' dynamics focuses on their integration level, as well as their morphological and functional properties, taking into account the principles of the compact city, social liveability and territorial cohesion, in order to develop quantifying parameters of urban quality and to promote human scale public spaces network.

2 MORPHOLOGIC ANALYSIS

Public space is the support of urban life and a reflection of the society it belongs to. Thus, we can say that the urban planning and public space design are critical to achieve urban quality. The transformation of urban liveability is a direct consequence of urban planning and design, and the result of the interaction between each person's private and public activities in the public space (Serdoura, *et al.*, 2000). Particularly important to the whole urban network is the liveability of the urban centre, which is the core of the urban activities.

Generally, the urban centre concept is directly related to its attractiveness level for the location of economic activities. Its configuration will be the result of the competitiveness between the different economic activities for the best location in the urban grid. Hillier *et al* (1993) states that one of the primary properties of the urban grid is to be the main generator of movement patterns. The correlation between these movement patterns are found to be measures of centrality and, therefore, can be used to assess the potential of public spaces for urban liveability.

The methodological framework of this study will be the description of several spatial variables (syntactic) and the analysis of their correlation with the functional variables (land uses) on specific areas that may present characteristics of centrality.

Syntactic variables can be used to measure different properties of the urban system. The variables used for this study were integration, control and connectivity.

2.1 The spatial variables

Obidos and Palmela present an urban structure with medieval origins. The medieval urban model is developed following several rules for the location and distribution of the main spaces and activities (Craane, 2009), which are normally anchored to one or more main axis. If there are defensive concerns for the settlement (which is the case in both towns), its urban grid may be totally or partially delimited by a ring of walls. In this case, the whole urban system will be conditioned, as the accessibilities will be limited, which facilitates the trade control and assures the safety of the citizens. However, this belt has a strong effect in the urban structure, particularly on the spatial perception of the whole urban system and in the distribution and organization of the most important public spaces.

The major part of Obidos urban network is inside walls (see Fig. 1). As its urban grid hasn't changed significantly during the 20th century, the spatial analysis of this case study is relevant to understand the dynamics associated to the public space and the activities located in a closed, medieval, urban grid, which dimensions and relative distances between blocks are naturally adequate to pedestrian pathways.

Obidos street pattern is characterized by a set of irregular intersections along a main North-South oriented axis (R. Direita), which forms a kind of deformed grid, widening and

narrowing to create small and diverse open spaces (see Fig. 2). This irregularity gives it a high level of choice of routes from any space to any other space, which is called a 'distributed' spatial system (Hillier & Hanson, 1984).

Palmela, although it is also a town with a medieval core, presents different characteristics, which deeply influence the correlations of natural movement in its urban grid. The urban grid is overlooking a defensive castle, but there are no wall surrounding it (see Fig. 3). Its opened urban fabric led to major changes in the urban grid, which has been growing in an uncontrolled way, outlining new expansion axis (see Fig. 4) which dislocated its centrality. Moreover, the most recent urban development's lack of coherence with the whole system is leading to increasingly more segregated spaces (see Fig. 5).

Fig. 1 Public space inside the walls of Obidos Fig. 2 Rua Direita of Obidos

Fig. 3 Palmela and its castle Fig. 4 First expansion to the centre of Palmela
Fig. 5 Segregated spaces inside the urban fabric of Palmela

The current study used the *space syntax* methodology to the spatial analysis of Obidos and Palmela's urban networks. This methodology was developed by Hillier and Hanson (1984) and consists on the correlation of natural movement patterns in the urban grid. *Space Syntax* is useful for the understanding of the formal logic of the urban fabric, in what concerns its evolution and the emergence of centralities and living open spaces where the main urban activities take place.

This methodology used the following variables:

    i. Integration – This measure represents the depth level of an axial line in relation to the whole axial lines system, which can be all the urban grid or just a limited number of axial lines within any radius (for example, radius 3 (r3)). The r3 integration is called "local integration". The resulting values are as higher as the analyzed axial line is more accessible.

ii.   Control – This variable reflects the importance of a space as a destination from the adjacent spaces, and is measured by the number of accesses from these spaces.

iii.   Connectivity – This measure expresses the intensity of connections of an axial line in relation to the adjacent ones. A high connectivity level will reflect a better perception of an urban space to a person who isn't familiar to it (Serdoura, 2006).

2.2 Spatial Configuration of the Centre

The current study started with the syntactic analysis of both villages, Obidos and Palmela. Figures 6 and 7 present the global integration map (rn) of each one. This measure defines the degree of accessibility of an axial line in relation to all the others of the system.
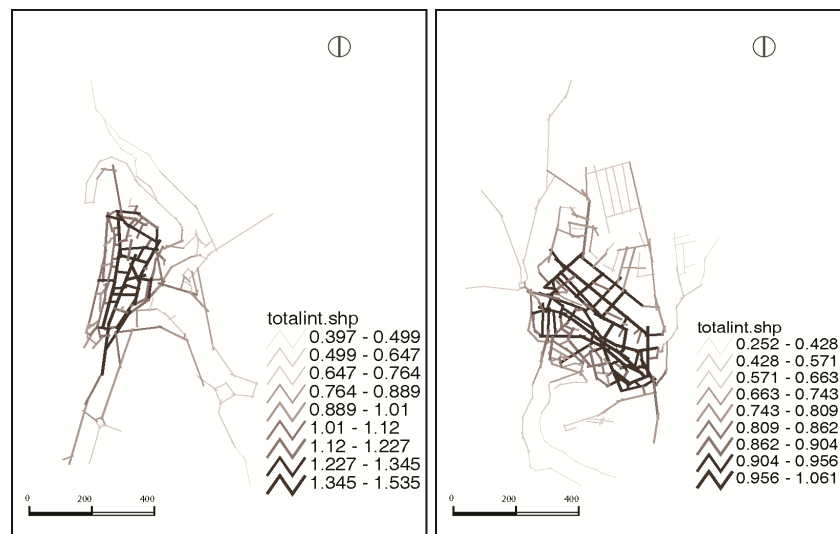
Fig. 6 Integration (rn) map of Obidos Fig. 7 Integration (rn) map of Palmela
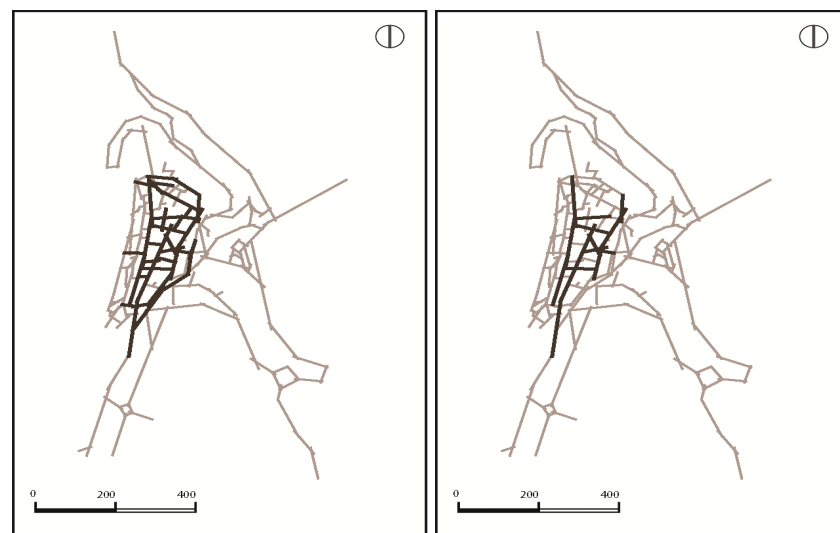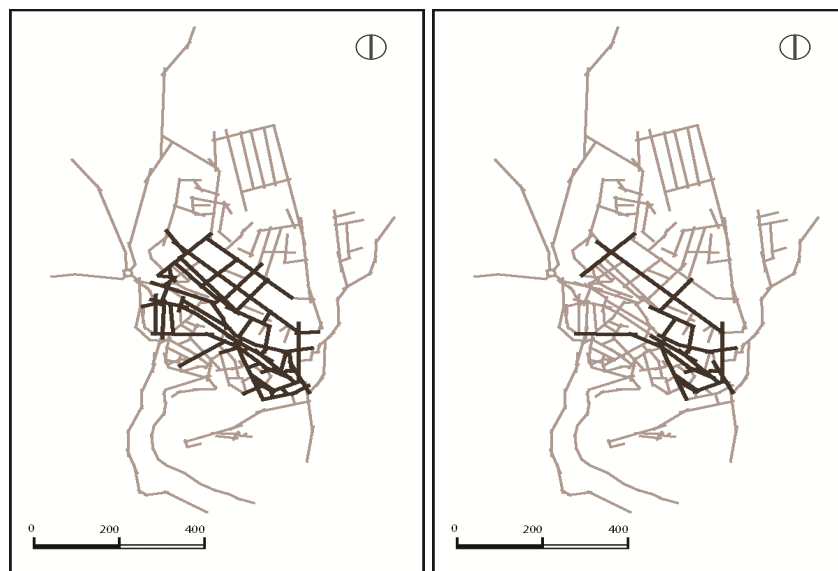

Fig. 8 Core 25% of Obidos Fig. 9 Core 10% of Obidos

To calculate the core, we compared the results of taking the 25% most integrated axial lines with the 10% most integrated lines. Obidos' 25% core integration (rn) level (see Fig. 8) extends from the South gate, along the main axis (R. Direita) and expands throughout the central and eastern area inside the walls. It covers a significant part of the 'in walls'

urban system. However, if we compare with the 10% core integration (rn) level (see Fig. 9), we distinguish better the main structure which is behind the urban system of Obidos. It is formed by 3 North-South axes, which link the South gate to the castle, and the more central west-east axial lines.

The case of Palmela is different, because its urban structure is opened (it doesn't have walls to limit it) and was fragmented with the several expansions to the urban system through time. The 25% core integration (rn) (see Fig. 10) extends along the medieval main axis (R. Contra Almirante Jaime Afreixo), at South, and expands to the larger and regular grid at North. This 'combined core' is more visible with the 10% most integrated lines (see Fig. 11), which reduces the core to a part of the medieval district and a diagonal axis (R. Gago Coutinho e Sacadura Cabral) and some of its intersections.

Although it has been already presented an idea of centre for both villages, there is yet something missing, which is fundamental to make an approximated profile of the centre: its ambivalence. In fact, the centre is, by definition, the most important part of an urban system, being therefore the most demanded area for all activities. However, there are some differences when it comes to locate a shop or a restaurant and a private house. The urban centres are made both for residents and foreigners. The first group are those who control spaces and the others are controlled by them, within a street network which purpose is to facilitate the relationship between these two groups (Ramos, 1997). This means that, generally, there is a distinction of two (sometimes overlapping) areas inside its structure, one destined to those who come from outside (which is a more accessible and public area), and another one for those who come from the inside (which is an equally accessible area but, generally, is more quiet and not so central) (Hillier & Hanson, 1984). These differences appear when we analyze the local integration (r3) map and compare to the total integration (rn) one.

Fig. 10 Core 25% of Palmela Fig. 11 Core 10% of Palmela

In the case of Obidos, being the South gate the most important one, there is a concentration of higher level lines of total integration (rn) directly linked to that area. These are the first locations visible to foreigners and also the most accessible to them. On the other hand, in the local integration (r3) map (see Fig. 12), we can see that there are some new strong lines parallel to the main axis (R. Direita), to the west. These are also accessible and central

spaces, but they are located in a secondary level in relation to the core, so they can be more adequate for housing.
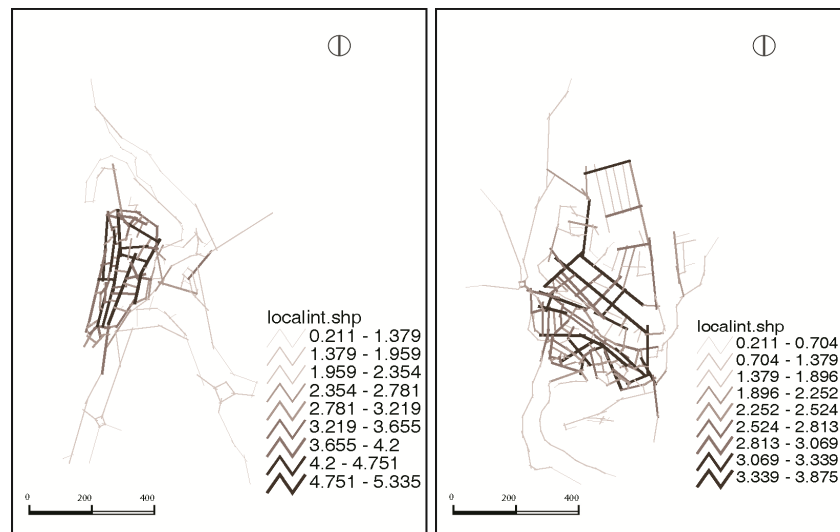
Fig. 12 Local Int. (r3) map of Obidos Fig. 13 Local Int. (r3) map of Palmela

Palmela's local integration (r3) map (see Fig. 13) reveals also that there are some central spaces more adequate for housing, in contrast with other spaces that are extremely visible and accessible to the foreigners and, therefore, with a more public character. In fact, the medieval main axes (R. Hermenegildo Capelo, R. Contra Almirante Jaime Afreixo and R. Serpa Pinto) and the R. Gago Coutinho e Sacadura Cabral give place to their nearest spaces in the local integration (r3) map.

2.3 Potential use of Public Space

In addition to the integration core of each village, it's necessary to proceed to its syntactic analysis, which assesses the correlations between a global dimension measure (integration (rn)) and a local dimension one (connectivity, control and local integration (r3)), which reflects the visibility scope of a dynamic observer and its understanding level of the global structure through a local structure (Ramos, 1997; Hillier, 1996). There are several possible correlations between local structure and the global system, which assess the ability of people to perceive the whole system at different dimensions. The values vary between 0 and 1, from low to high intelligibility.

The overlap of the local and global measures generates different syntactic properties, which can be described as:

Global vs Local properties

> i. Integration (rn) vs Connectivity – illustrates the global intelligibility of the system.
>
> ii. Integration (rn) vs Control – calculates the global accessibility of spaces with high control values.
>
> iii. Integration (rn) vs Integration (r3) – reflects the relation strength between parts that form a whole.

Local vs Local properties

    i. Connectivity vs Control – reflects the relation strength between parts at a local scale.

    ii. Connectivity vs Integration (r3) – calculates the local intelligibility of the system, or the facility to identify a space with a good local integration level.

    iii. Control vs Integration (r3) – calculates the accessibility of spaces with high control values from the inside of the urban grid (Ramos, 1997).

In what concerns to the correlation analysis of "Integration (rn) *vs* Connectivity", Obidos (r=0,77) presents a relatively high degree at the global system scale. In fact, this correlation means that, in Obidos, nearly 60% of the connectivity may be explained by integration (rn). In the case of Palmela (r=0,62), just 38% of the lines have a strong correlation "Integration (rn) *vs* Connectivity". When we analyze the same measure for the 25% core, we conclude that the values fall deeply and more in the 10% core. This happens because the spaces with higher values of this measure are mainly located in peripheral areas, being often preferred for residential uses.

The analysis of the correlation "Integration (rn) *vs* Control" reveals that the accessibility level of Obidos and Palmela systems is relatively low, increasing significantly to both cores 25% and decreasing again to cores 10%. This means that the greater potential areas for the use of public space by foreigners are located at its core 25%. The spaces with greater control values of the core 25% of Obidos are identified in Fig. 14 and 15 by the numbers (1) and (2), and correspond to the end of R. Direita and R. Pe. Antonio Almeida. This means that, usually, high control spaces aren't the most accessible ones, in spite of their relative importance. This characteristic indicates, generally, favourable conditions to residents and local life. However, a very low degree of this correlation may indicate that the urban grid has too many segregated spaces.
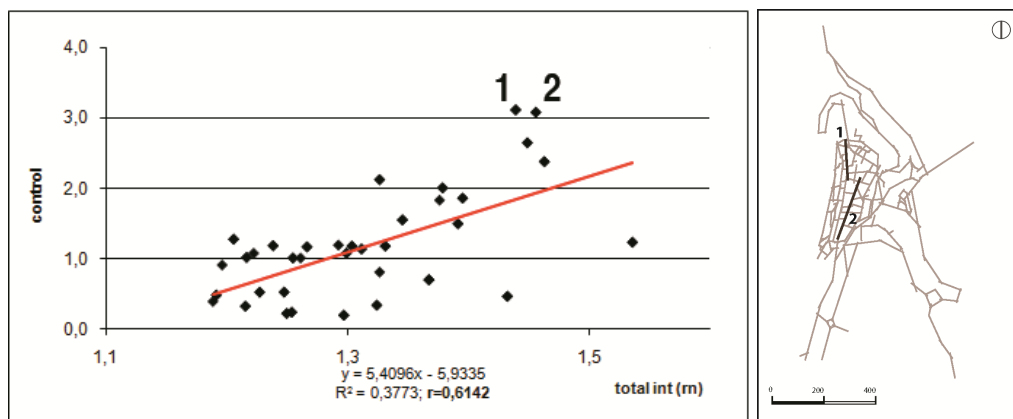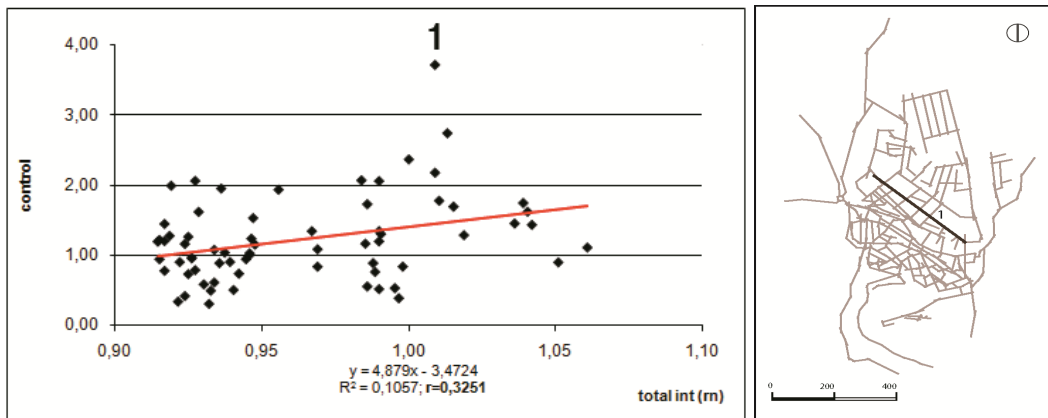

Fig. 14 Most accessible spaces in Obidos Core 25% Fig. 15 ID of most accessible spaces in Obidos

In the case of Palmela, the space with greater control values of the core 25% are identified in Fig. 16 and 17 by the number (1), and correspond to the R. Gago Coutinho e Sacadura Cabral. This is the main axis of the first expansion to the centre, which stands out for its regularity, contrasting with the previous urban grid.

The measure of correlation "Integration (rn) *vs* Integration (r3)" reflects the cohesion of the whole system. In fact, the highest values are found on the analysis of the urban system scale, but Obidos presents a significantly higher correlation, indicating that it has a stronger cohesion than Palmela. Effectively, Obidos has 70% of its most locally integrated

(r3) axial lines matching the most total integration (rn) values, while Palmela has only 55%.

Fig. 16 Most accessible spaces in Palmela Core 25% Fig. 17 ID of most accessible spaces in Palmela

The correlation measure of "Connectivity *vs* Control" indicates the degree of cohesion between the parts of the urban system. It is a local measure that gives higher values to those spaces with simultaneously highest control and connectivity values, which can be the best ones for economic activities location. Both for Obidos and Palmela, the highest values were relative to Core 10%, with an almost perfect correlation (Obidos r=0,92; Palmela r=0,93). The spaces which presented the highest degree of this measure in Obidos were the same as for "Integration (rn) *vs* Control", the end of R. Pe. Antonio Almeida and R. Direita. Therefore, we can conclude that in the urban network of Obidos, these are spaces for local life and a meeting point between residents and visitors.

Palmela presents an even better correlation of "Connectivity *vs* Control" for all the scales of the urban system, but mainly for the Core 10%. The spaces which the high level of connectivity can be explained by the equally high levels of control are identified with the numbers (1), (2) and (3) in Fig. 18 and Fig. 19, and correspond to the R. Gago Coutinho e Sacadura Cabral (1), R. General Amilcar Mota (2) and Largo de S. Joao Baptista (3). These values reinforce the intelligibility level of this more regular part of the grid, in what concerns the local life and the economic activities location. The medieval centre (4) has medium values of this correlation, as we can verify in Fig. 18, although there are three spaces near the highest values which correspond to the V shape lines at South.
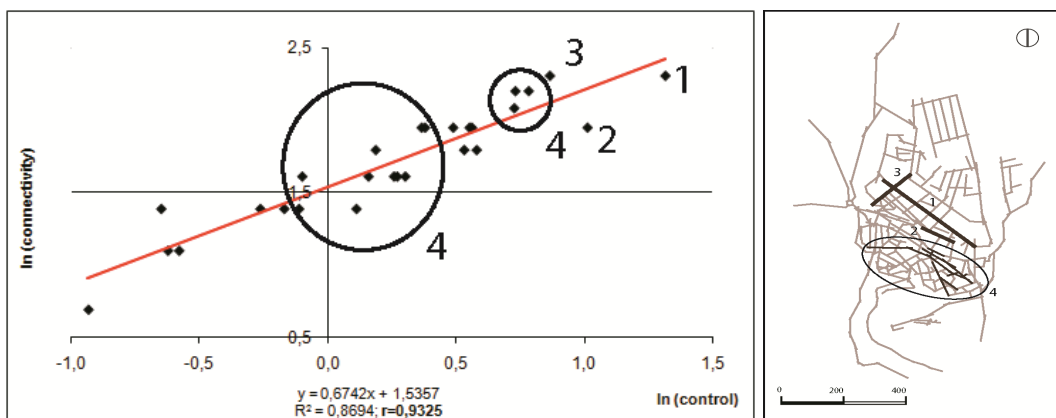
Fig. 18 Spaces with highest "Connectivity vs Control" values in Palmela Core 10%
Fig. 19 Identification map of these spaces

The "Connectivity *vs* Integration (r3)" measure reflects the extremely high local intelligibility of the both systems, mainly at the Core 10% scale (Obidos r=0,98; Palmela r=0,98). This means that spaces with good local integration (r3) have also good connectivity levels. In the case of Palmela, the spaces with higher values are once more R. Gago Coutinho e Sacadura Cabral and Largo de S. Joao Baptista, but the third more intelligible space is part of the medieval core, marked in Fig. 19 with the number (4), which name is R. Hermenegildo Capelo.

The analysis to the "Control *vs* Integration (r3)" values indicates that both Obidos and Palmela core 10% have good local accessibility (Obidos r=0,95; Palmela r=0,85).

3 URBAN LIVEABILITY

The syntactic analysis of an urban network helps deepen the understanding of spatial organization, which is the key both to the forms of the city and how human beings function in an urban environment. In fact, urban uses are related to the form of the city through two functional factors: "how we as individuals find the city intelligible, and how we move around it" (Hillier, 1996: 152).

The current knowledge suggests that socio-economic forces shape the city through the relations between movement and the urban structure. Therefore, we can say that spaces have a set of potentials, and people exploit these potentials as individuals and collectivities in using them (Hillier, 1996).

In fact, location has a crucial effect in a grid, as it can either increase or diminish the potential contact availability of each movement by-products. For that reason, we selected the axial lines of each grid which presented higher levels of each analyzed measure, and found an intelligibility network, which works as a 'tool for generating contact' of the urban system (see Fig. 20 and 21).

These are the most recognizable spaces for foreigners and the most central in general. Consequently, they present a greater potential to promote urban activities and contribute for the increase of liveability in the urban system. Related to these linear spaces, conceived for dynamic activities, there is a complementary network of open public spaces (represented in grey, on Fig. 20 and Fig. 21, identified with numbers) which, because of its configuration, are suitable for static activities of meeting and leisure. They are also appropriate places for the location of several economic activities which could use their meeting point character contributing for the liveability of that space.

The different correlation values of the linear spaces and their combination gives each open space a different character, making it more suitable for specific activities.

In the case of Obidos, there are three axes which are crucial for the appropriation of public space by foreigners, which are R. Direita, which links the spaces identified with the numbers (2), (4) and (5), R. Pe. Antonio Almeida, which goes from the space (2) to (4) and R. Pe. Nunes Tavares, which links (7) and (8) spaces. These axes present the major levels of intelligibility (total int (rn) vs ln (connectivity)), accessibility (total int (rn) vs control) and cohesion (total int (rn) vs local int (r3)) (see Fig. 20). These linear spaces guide people through a route of open spaces which can be very liveable and even galvanize economic activity, if municipal territorial management promotes a better use for these public spaces. The main spaces for urban liveability are those marked in Fig. 21 with a number. However, the most central ones are the following: (2) Beginning of Rua Direita; (3) Largo de Sao Pedro; (4) Largo de Santa Maria; (5) Largo de Sao Tiago. The other three spaces are also

good for the location of economic activities; in spite of being more peripheral. However, they are still in the most intelligible network of spaces, being therefore some of the most central and recognizable spaces of the whole system.
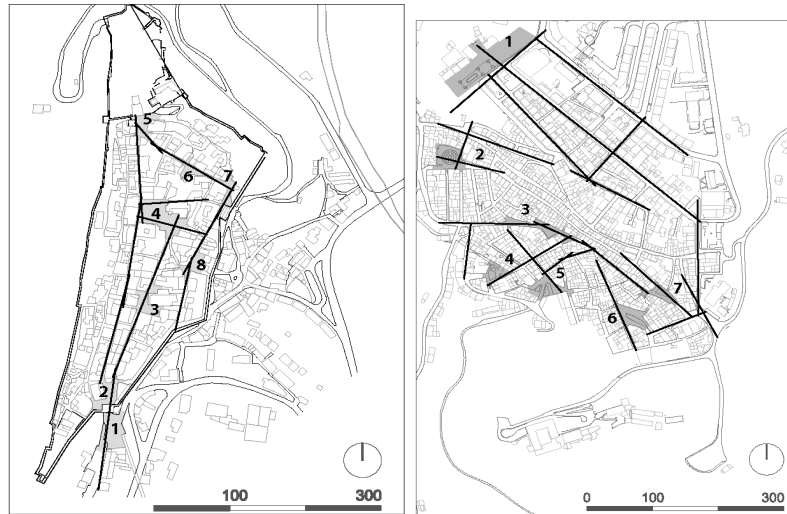
Fig. 20 Network of spaces with potential for urban liveability in Obidos
Fig. 21 Network of spaces with potential for urban liveability in Palmela

Palmela presents a much more fragmented centrality (see Fig. 21), as it was already referred previously. The selection of the linear spaces with greater potential to promote liveability to the urban system of Palmela indicates that there are two different networks that are connected, but work separately, the medieval core, to the South, and the regular grid, which marks a new centrality with the intersection of Rua Gago Coutinho e Sacadura Cabral and Largo de Sao Joao Baptista (1). The axes which are crucial for the appropriation of public space by foreigners inside the medieval core are Rua Mouzinho de Albuquerque, which ends in Largo da Boavista (4); Rua do Arrabalde, which ends in Largo d'El Rei Dom Afonso Henriques (6) and Rua Hermenegildo Capelo, which is the main axis linked to these spaces and includes Largo do Mercado (3). The most central open spaces are these ones and Largo de Sao Joao Baptista (1), which is a main entrance to the core of Palmela. The other spaces, as it happens in the case of Obidos, are also good for the location of economic activities, in spite of being peripheral to the most intelligible spaces.

Our cities have been presenting an inability to promote successful public squares and open spaces, where population could take advantage of a good environment (Campos, 1997). That can be attested by the confirmation of the low static occupation rates of our open spaces. Both in Obidos and Palmela, their open spaces were found empty, with a clear lack of dynamism, in spite of their potential. Partially, this happens because the economic activities which are located in those spaces (if there are any) are not incrementing a proper appropriation of the public space by people. On the other hand, they seem to prefer linear central spaces, which are places of dynamic flows, being consequently more probable to have more people interested to enter the shop / restaurant.

To improve liveability in those places, beyond public space common requirements, public open space must have a different treatment from streets, in order to convince people to stay. Requirements as comfort, safety, adequate land uses, inclusivity, robustness, have to be prior to its design and maintenance (Carmona *et al*, 2004).

4 CONCLUSION

Liveability spaces are the by-product of the spatial configuration of its urban grid and potential to generate social interaction. The analysis of these two case studies described how public spaces located in strategic areas of the urban core could take advantage of their high levels of centrality, accessibility and intelligibility, improving urban design and promoting the location of economic activities which would generate more open space activities and social interaction.

The street network of Obidos is characterized by a formal coherence, developing along an axis and surrounded by a ring of walls, which reinforces its centrality. Its tourism potential has been developed through the promotion of traditional trade and outdoor events that allow a permanent occupation and liveability of the public space. However, in the interstices of the central areas, there are quieter areas, suitable for residential use.

The analysis of the intelligibility of the urban system of Obidos reveals a strong cohesion of the urban fabric at global and local scale, allowing an overall good intelligibility, especially at the local level. In what concerns the network of open spaces, we can conclude that they are mostly located in central areas, which reveals a great potential for their appropriation and liveability both by residents and visitants.

Palmela is distinguished mainly by its greater complexity and expansion of its centre, without coherence concerns. This lack of coherence in the expansion gave the centre a fragmented nature. Consequently, the urban centre is divided into two areas that work separately from each other. Its centre has shifted to the R. Gago Coutinho e Sacadura Cabral and to Largo de S. Joao Baptista, two peripheral areas with respect to most of the centre. This transformation gave prominence to a more regular grid which is adjacent to the older urban fabric. The lack of open spaces reinforces the importance of Largo S. Joao Baptista, further segregating the medieval core.

Centrality is, clearly, more than a simple state; it is more a spatial-functional process. It can be found at any level of the urban structure and may also, over time, change, as people change the way they use the public space or transform the urban morphology (Hillier, 1999). In fact, liveable spaces are crucial for a dynamic centre to survive and keep its importance. The continuous lack of liveability and dynamic functions in an urban core can reflect and deepen the gradual segregation of former central areas.

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