



**CLOSE  
CLOSER**

CLOSE to cities, CLOSER to people



**Scientific committee**

Maria Rosália Guerreiro  
Miguel Sales Dias  
Pedro Faria Lopes  
Sara Eloy

**Editors**

Ana Moural  
Pedro Faria Lopes  
Sara Eloy

**CLOSE to cities and CLOSER to people**

ISCTE-IUL, 2014

This publication has been supported by the AAL4ALL (Ambient Assisted Living for All)  
13852 QREN, project co-funded by COMPETE under FEDER via QREN Programme.







The present book provides an overview of the work presented in Sep/Oct 2013 at an exhibition carried out in ISCTE-IUL, under the theme *CLOSE to cities and CLOSER to people*, in the scope of the *Lisbon Architecture Triennale 2013*.

The exhibition was an opportunity to focus on the research work developed within Architecture, Urbanism, Information Technologies and Computer Graphics areas and discuss cities as self-organized networks.

Network thinking in urbanism and architecture comes from the idea that the city living depends on the vast number of different paths and connections. Using Lisbon as a case study, the exhibition explored the concept of space affordance and was based on the idea that the life of the public spaces is largely dependent on space matters.

The understanding of the cities dynamics, as an extension of the human mind to the environment, can help us to reinterpret and regenerate the city at different scales. With a bottom-up approach designers can promote an urban development more efficiently connected to the existing space structure and users' behavioural patterns.

The increasing economic crisis as well as the continuing ageing of the population request the renovation of the public spaces as well as other strategies to promote socialization and autonomous living in order to minimize these problems.

The research shown in this book proposes to map the web of space structure connections and use that knowledge to inform design with the existing needs and behaviours of the citizens.

Two complementary levels of action are combined:

- i) First, the design of a pedestrian network informed by the understanding of patterns of public life and the potential and weaknesses of some Lisbon's public spaces. Accessibility, uses and activities, comfort and image and socialization, all aspects that form the diagram of the place (placemaking) are shown. Amongst several methods of analysis, space syntax analysis is used and it is correlated with other local observation techniques and 3D virtual immersive simulations;
- ii) Second, the possibility of Ambient Assistive Living (AAL) technologies to support citizens when carrying out daily tasks by providing a nonintrusive mapping of their behaviours.

The aim of the exhibition was to create a complementary event in the *Lisbon Architecture Triennale 2013* programme that illustrated an overview on the plurality of digital spatial practices by architects and researchers, on important and current issues affecting cities in the world, namely placemaking, ageing population and civic engagement.



## AUTHORS | AFFILIATION

Adriana Afonso | ISCTE-IUL  
Adriano Moreira | UM  
Ana Moural | ISCTE-IUL, ADETTI-IUL  
Antero Salgado | CCG  
Cláudia Peixoto | Fraunhofer  
Filipe Meneses | CCG  
Filipe Sousa | Fraunhofer  
Flávio Freire | ISCTE-IUL  
Gil Gonçalves | INOVA+  
Graça Cordeiro | CIES-IUL, ISCTE-IUL  
Hugo Meneses | ISCTE-IUL  
Israel Guarda | IHA, FCSH-IUL  
João Caldas | ISCTE-IUL  
João Peixoto | CCG  
Johan Benesch | INOVA+  
Jorge d'Alpuim | ISCTE-IUL, ADETTI-IUL  
Leandro Martinho | ISCTE-IUL  
Luís Carvalho | Fraunhofer  
Marco Menino | ISCTE-IUL  
Maria Rosália Guerreiro | ISCTE-IUL  
Mariana Ferreira | ISCTE-IUL  
Miguel Sales Dias | Microsoft Portugal, ADETTI-IUL, ISCTE-IUL  
Nádia Romão | ISCTE-IUL  
Pedro Faria Lopes | ADETTI-IUL, ISCTE-IUL  
Raquel Sousa | IncreaseTime  
Rita Portela | ISCTE-IUL  
Rúben Viegas | ISCTE-IUL  
Samih Eisa | CCG  
Sara Eloy | ADETTI-IUL, ISCTE-IUL  
Tiago Martins | ISCTE-IUL  
Tiago Pedro | ISCTE-IUL, ADETTI-IUL



<b>1   LISBON PEDESTRIAN NETWORK</b> .....	11
Maria Rosália Guerreiro, Sara Eloy, Pedro Faria Lopes, Israel Guarda, Graça Cordeiro	
1.1   Martim Moniz woke up	12
Leandro Martinho, Mariana Ferreira	
1.2   Configurational analysis of public space: Alameda D. Afonso Henriques in Lisbon	14
Nádia Romão, Rúben Viegas	
1.3   Analysis if the social impact of an intervention in the consolidated fabric of Amoreiras in Lisbon	16
Nádia Romão	
1.4   Urban configuration aspects of two avenues in Lisbon: Duque d'Ávila and Conde Valbom	18
Hugo Meneses	
1.5   Configurational analysis from Praça Duque de Saldanha	20
Adriana Afonso, Rita Portela	
<b>2   DIGITAL TECHNOLOGIES: ASSIST, SIMULATE, MAP AND EVALUATE</b> .....	23
Sara Eloy, Miguel Sales Dias, Pedro Faria Lopes	
2.1   Counting App for local observations and space syntax	24
Pedro Faria Lopes, Sara Eloy, Tiago Martins, Marco Menino, João Caldas, Flávio Freire	
2.2   CaveH - virtual reality simulation system	26
Jorge d'Alpuim, Tiago Pedro	
2.3   Immersive virtual reality as an architectural tool	28
Ana Moural	
<b>3   AMBIENT ASSISTED LIVING</b> .....	31
Miguel Sales Dias, Sara Eloy	
3.1   Wi-fi indoor positioning solution	32
Adriano Moreira, Antero Salgado, Filipe Meneses, João Peixoto, Samih Eisa	
3.2   Kshirt	33
Raquel Sousa, Johan Benesch, Gil Gonçalves	
3.3   Caretaker application	34
Cláudia Peixoto, Filipe Sousa, Luís Carvalho	
<b>4   EXHIBITION</b> .....	36

<b>Fig. 1</b> - Center core of the city of Lisbon .....	10
<b>Fig. 2</b> - Martim Moniz pedestrian movement (Mariana Ferreira, 2012) .....	12
<b>Fig. 3</b> - Connectivity axial map; integration axial map; R3 integration axial map .....	12
<b>Fig. 4</b> - Mercado de Fusão, Martim Moniz (Facebook, 2012) .....	13
<b>Fig. 5</b> - VGA connectivity map; VGA integration map .....	13
<b>Fig. 6</b> - Axial map of Lisbon: integration HH. Credits: Teresa Heitor and João Pinelo .....	14
<b>Fig. 7</b> - Pedonal traffic. Source: Inês Horta, José Piteira, Nuno Matos, Tiago Figueiredo, PU II 2012-2013 .....	14
<b>Fig. 8</b> - Connectivity .....	15
<b>Fig. 9</b> - Clustering .....	15
<b>Fig. 10</b> - Visual integration HH .....	15
<b>Fig. 11</b> - Proposal .....	15
<b>Fig. 12</b> - Axial map of Lisbon: integration HH. Credits: Teresa Heitor and João Pinelo .....	16
<b>Fig. 13</b> - Axial map integration HH r3 - analysis of the original .....	17
<b>Fig. 14</b> - Visibility map clustering coeficiente - analysis of the original .....	17
<b>Fig. 15</b> - Axial map integration HH r3 - analysis of the proposal .....	17
<b>Fig. 16</b> - Visibility map clustering coeficiente - analysis of the proposal .....	17
<b>Fig. 17</b> - Time-lapse photography .....	17
<b>Fig. 18</b> - Pedestrian flows .....	18
<b>Fig. 19</b> - VGA (Connectivity) .....	18
<b>Fig. 20</b> - Conde Valbom and Duque d' Ávila   Location .....	18
<b>Fig. 21</b> - Conde Valbom   Lateral sidewalk .....	19
<b>Fig. 22</b> - Duque de Ávila   Pedestrian strip and bicycle lane .....	19
<b>Fig. 23</b> - VGA map of the study area .....	20
<b>Fig. 24</b> - "Real" crossing tracking - morning period .....	20
<b>Fig. 25</b> - "Real" crossing tracking - afternoon period .....	20
<b>Fig. 26</b> - Axial map - "real" pedestrian crossing .....	20
<b>Fig. 27</b> - Axial map - "legal" pedestrian crossing .....	20
<b>Fig. 28</b> - VGA analysis- integration HH .....	21
<b>Fig. 29</b> - VGA analysis - connectivity .....	21
<b>Fig. 30</b> - Proposal 1 - the crosswalk .....	21
<b>Fig. 31</b> - Proposal 2 - the roundabout .....	21
<b>Fig. 32</b> - Simulation of proposal .....	21
<b>Fig. 33</b> - Technologies and city life: evaluating use and assisting people .....	22
<b>Fig. 34</b> - App starting screen .....	24
<b>Fig. 35</b> - Single count start options .....	24
<b>Fig. 36</b> - Single count parameters definition .....	24
<b>Fig. 37</b> - Counting time interval input .....	24
<b>Fig. 38</b> - Fast configuration counting items pick .....	24
<b>Fig. 39</b> - Fast pick layout configuration .....	25
<b>Fig. 40</b> - Custom pick layout configuration .....	25

<b>Fig. 41</b> - Counting report output .....	25
<b>Fig. 42</b> - Report sharing options .....	25
<b>Fig. 43</b> - App general settings for brightness and airplane mode .....	25
<b>Fig. 44</b> - Photo taken at CAVE at Lousal (photo by Ana Moural) .....	26
<b>Fig. 45</b> - May 10th, 2008. CAVE - Lousal (photo by Pedro Faria Lopes) .....	26
<b>Fig. 46</b> - CAVE at Lousal projection infrastructure .....	26
<b>Fig. 47</b> - Screenshot taken from landscape in solar system simulation with CaveH .....	27
<b>Fig. 48</b> - Screenshot taken from ISCTE-IUL model's 2nd courtyard simulation with CaveH .....	27
<b>Fig. 49</b> - Amoreiras hill and its relation with the axis Avenida Engenheiro Duarte Pacheco and one of the most important Lisbon's square, Marquês de Pombal .....	28
<b>Fig. 50</b> - Street view near Vila Raul - photo .....	29
<b>Fig. 51</b> - Street view near Vila Raul - CaveH screenshot .....	29
<b>Fig. 52</b> - Street view near Vila Raul - CaveH screenshot .....	29
<b>Fig. 53</b> - Living Lab Xbox Room, Microsoft Lisbon, Ambient Assistive Living technologies in the scope of project QREN AAL4ALL .....	30
<b>Fig. 54</b> - Visual indoor position of users .....	32
<b>Fig. 55</b> - View of the shirt with the attached device .....	33
<b>Fig. 56</b> - Device viewed from various angles .....	33
<b>Fig. 57</b> - Questionnaires available to be answered by seniors .....	34
<b>Fig. 28</b> - Senior's overview .....	34
<b>Fig. 59</b> - Video tutorials available to be watched by seniors .....	34
<b>Fig. 60</b> - Senior weigh measurements .....	34
<b>Fig. 61</b> - Exhibition plan .....	37

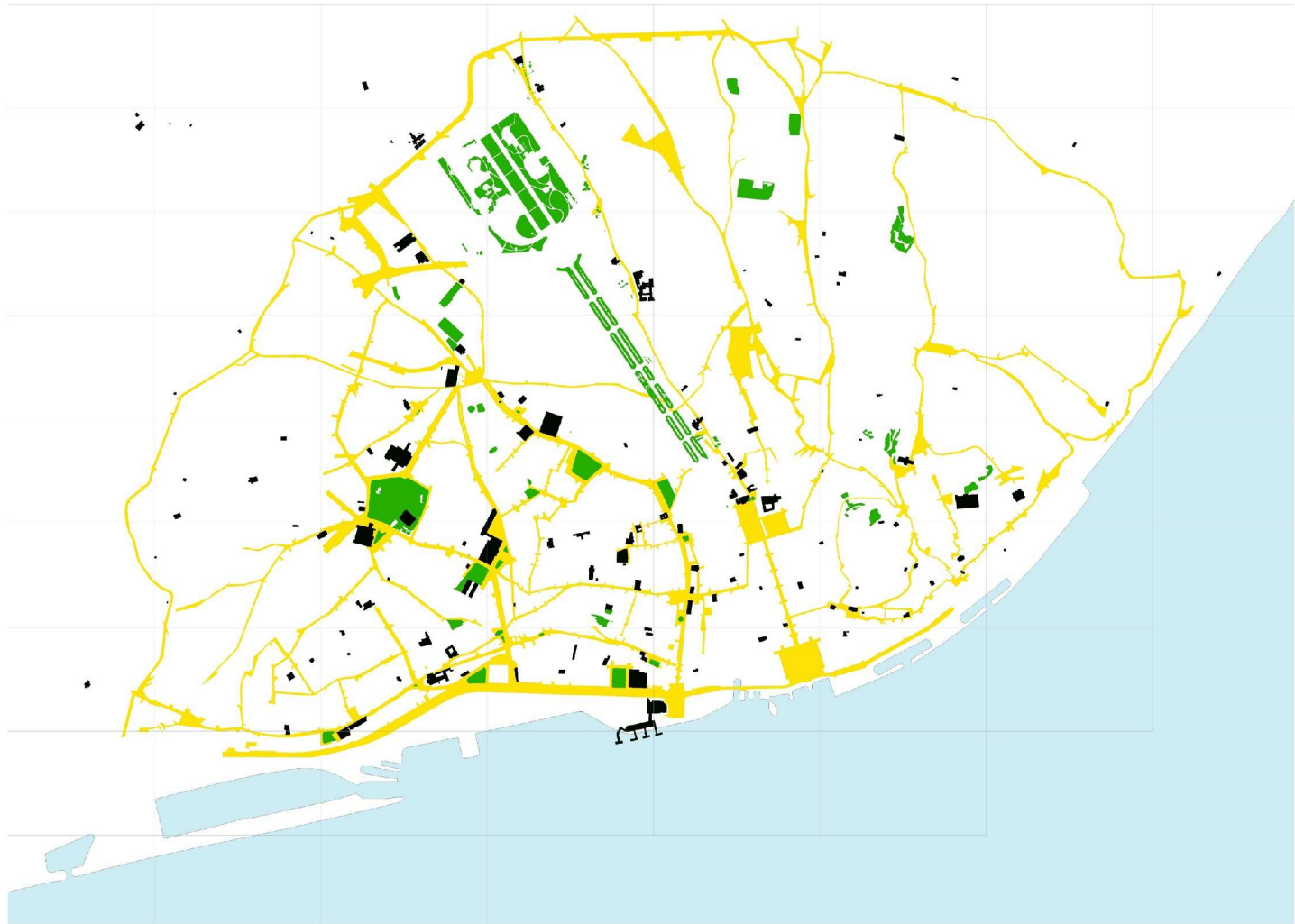


Fig. 1 - Center core of the city of Lisbon, larger void spaces (Ruben Viegas, Urban Project II course, 2011/2012, coordinator: Maria Rosália Guerreiro)



# 1 | LISBON PEDESTRIAN NETWORK

Rosália Guerreiro, Sara Eloy, Pedro Faria Lopes, Israel Guarda, Graça Cordeiro

Lisbon's central area is settled on the sharper relief of its surrounding territory. As we see it, the relief has been a forever challenge for the urban form. The mythical Lisbon's hills have become a key component of its iconography and identity but also the easiest argument which prevents the promotion of alternative forms of transportation within the city. Behind this apparent difficulty several ridge and valley lines emerge throughout the territory forming lines of continuity. The opportunity to generate a continuous network through the linkage of these natural lines offers excellent conditions for pedestrian walking. The traditional city streets were developed upon this natural relief-based network which formed the natural human paths.

These pathways followed the logic of the lower slope or the 'law of the minimum' by which an option for longer path is only justified if the effort to overcome the slope is greater than the effort to overcome the distance.

The traditional city has been growing on this matrix developed at a human scale. Taking advantage of the land's physiography with the increasing and gradual use of the car, in the 20th century, the city was restructured mainly based on the needs of circulation of the motor vehicles. This planning strategy proved to be against the human pedestrian logics and repeal the traditional walkability of the city. In fact the continuity of the pedestrian networks was broken and the myth of Lisbon being a difficult territory to walk settled down. However, the physical and spatial structure of Lisbon still presents a set of opportunities which allow restoring this traditional network through a series of pedestrian streets that aggregate plazas, squares and parks. If planned in an integrated way these places have the potential to be a powerful instrument.

## 1.1 | Martim Moniz woke up

Leandro Martinho, Mariana Ferreira



Fig. 2

After a brief analysis of existing public spaces in the city of Lisbon, Praça Martim Moniz was selected as the object of our Space Syntax and Complexity course (Fig.2).

Our main objective was to understand the relationships between the configuration of the site and the set of social, economic and environmental phenomena. We found that these phenomena correspond to patterns of consciousness, movement, interaction and densification of people in relation to the space they use and share (public space).

The study started with the analysis of the square within the structure of the city (Fig. 3), ending with a more detailed analysis of its spatial layout, uses and human behaviour (Fig. 5). Martim Moniz square is a central space in the city. Heavily influenced by immigrants, it presents a multicultural character where informal activities take place.

This square, formerly classified as a disqualified space, is now characterized by a pleasant environment, used by people of

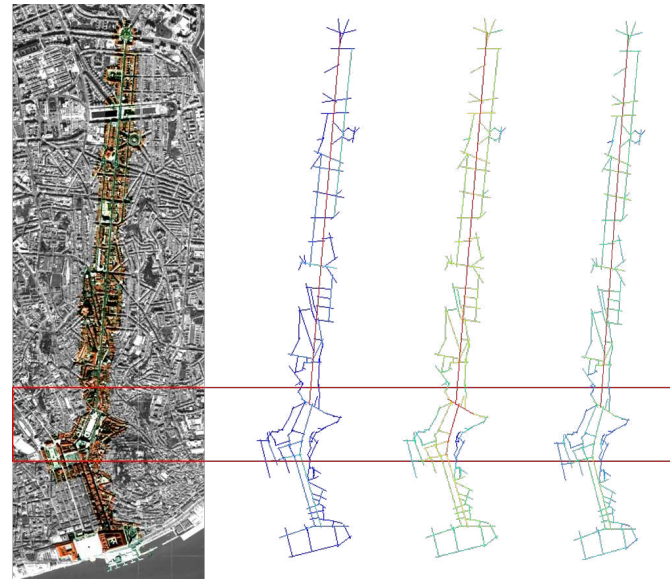


Fig. 3

different social status and nationalities (Fig. 2). Since the square is surrounded by lanes with intense traffic we suspected from the beginning that the accessibility of the square needed to be improved.

The space syntax analysis showed that Martim Moniz square makes use of its greatest visual potential, where the main axis of the square (where everyone can see the square almost completely and witness all the events) is host to a large flow of people. This analysis has also highlighted that the problem of access to the square is yet to be solved, helping us to develop our proposal to improve it.

In the VGA connectivity map (Fig. 5), on the south side of the square it is indicated the location with the greatest potential. However the lack of activities, the strong shading and the physical separation of the square with different elements, make this just a place of passage. The integration VGA map shows the most integrated spaces. The analysis performed



Fig. 4

with Depthmap software did not take in account the attractors of the square.

Why is this square working through this renovation now and not before? This was the question that induced us to analyse this space with space syntax.

Given the previous lack of accessibility to the square, few people dared to risk crossing a road with heavy traffic without a strong reason. After the implementation of the Mercado de Fusão, the square came alive and gained a new life. It is no longer just a bridge crossed by local merchants with their goods, but a new recreational place with colour, sound, emotions and frequent activities that host people from all over Lisbon and the world. However, there is still the need to improve the accesses to the square.

With this work, besides understanding the public space, we gained experience in getting and analysing information. Based on these, we are now also able to propose improvements to

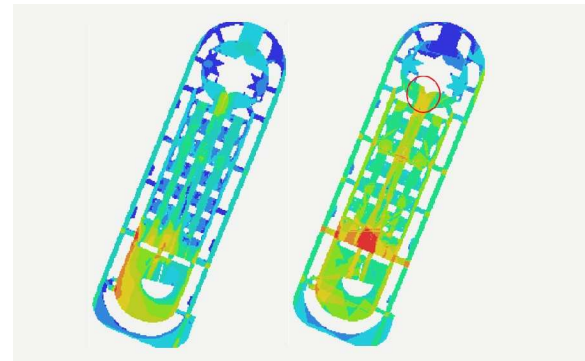


Fig. 5

Fig. 2 - Martim Moniz pedestrian movement (Mariana Ferreira, 2012)

Fig. 3 - Connectivity axial map; integration axial map; R3 integration axial map. Martim Moniz square and Almirante Reis avenue

Fig. 4 - Mercado de Fusão, Martim Moniz (Facebook, 2012)

Fig. 5 - VGA connectivity map; VGA integration map. Martim Moniz square

enhance the life of the city.

We understood that Depthmap is a tool that gives the architect an abstract view of a place. It is up to then read the information provided and take advantage of it, like we did with the connectivity and integration maps. This software tool shows us the potential use of a certain place and enables designers to take advantage of this information.

## 1.2 | Configurational analysis of public space: Alameda D. Afonso Henriques in Lisbon

Nádia Romão, Rúben Viegas

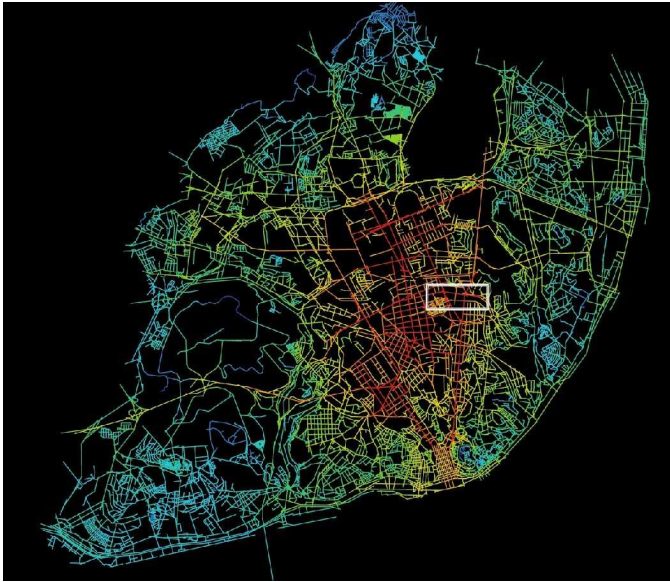


Fig. 6

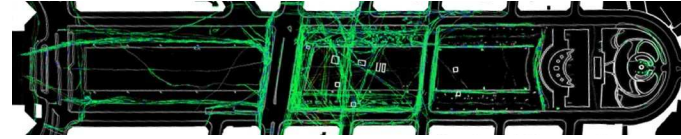


Fig. 7

Fig. 6 - Axial map of Lisbon: integration HH. Credits: Teresa Heitor and João Pinelo

Fig. 7 - Pedonal traffic recorded by local observation. Source: Inês Horta, José Piteira, Nuno Matos, Tiago Figueiredo, PU II 2012-2013

Fig. 8 - Connectivity VGA

Fig. 9 - Clustering VGA

Fig. 10 - Visual integration HH VGA

Fig. 11 - Proposal intervention in Alameda D. Afonso Henriques

The space syntax theory explores the social content of spatial patterns; this theory was developed in the 70s by Bill Hillier and Julliene Hanson at University College London.

The work here presented shows the application of this study to the Alameda D. Afonso Henriques in Lisbon, with the following goals:

- Identify the spatial features that are related to different uses of public space;
  - Discuss the relevance of the social potential and its implications on the spatial urban structure;
  - Experiment and demonstrate the applicability of this theory, by using it in a real urban scenario and by analyzing known places in order to better understand urban social dynamics.
- Alameda D. Afonso Henriques was built in the 1940s and shows a strong monumental character due to its scale, formality and symmetry. This space is located in the integration core of the city which means that it is the area with

the highest degree of accessibility measured by integration variable HH, according to Hillier and Hanson (1984) (Fig.6).

The data about the site was collected by:

- Registration of pedestrian flows, movement and activities through tracking and video time-lapse observation techniques;
- Use of Depthmap software to define syntactic measures (axial maps and visibility maps);
- Previous and continuous field experience.

Field observation revealed a higher flow of pedestrians in the central area of the Alameda as shown in Fig. 7. This fact contradicts the connectivity and integration HH measures which shows a higher movement potential on the west and south part of Alameda. However, that potential calculated by space syntax is verified in the most ephemeral activities that uses plenty of space, e.g. freshman hazing of the nearby university (Instituto Superior Técnico) and public manifestations. The fact that space syntax analysis was done



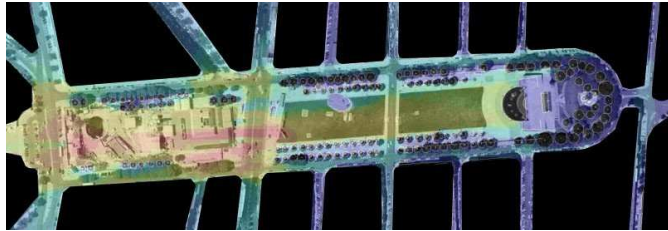


Fig. 8

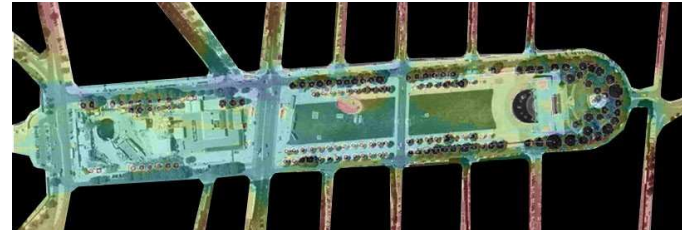


Fig. 9

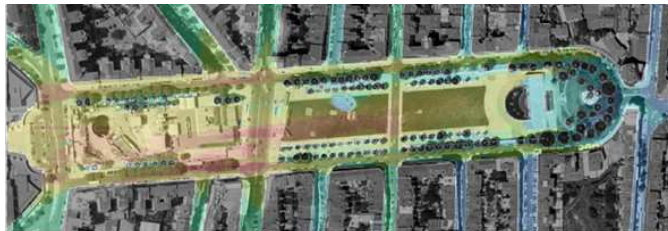


Fig. 10

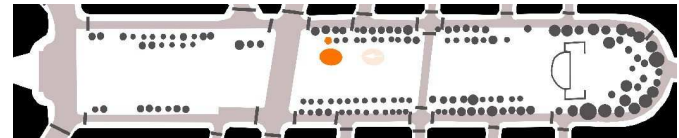


Fig. 11

just to the Alameda area, without taking into consideration the surrounding streets, has also to be considered. Control and controllability's measures reinforce the potential use of the west side of the Alameda. The visual clustering coefficient precisely emphasizes the area where higher pedestrian intensity is visible: the northern central of Alameda (Fig. 10). The performed analysis enabled us to understand the existing patterns and to speculate about possible interventions as follows:

- the crossing of the Rua Carlos Mardel (west side of the Alameda) would benefit with the inclusion of a pedestrian crossing to emphasize a path that people already use doing jaywalking (Fig. 7);
- the relationship between the children's playground and the coffee area does not allow the caretakers to have a broad vision, so it is proposed the relocation of the playground (Fig. 11).

This study revealed that the syntactic measures should be used in its potential way and in some cases, as in Alameda D. Afonso Henriques, other observation techniques are needed. In order to correctly apply this theory one should have a good knowledge of each one of the space syntax's variables and also have a good understanding about the place. Identifying the strengths and weaknesses of a public space allows us to inform strategic urban design through the use of a bottom-up design approach that will be more efficient and with lower costs.

#### REFERENCES

Hillier, B. and Hanson, J. (1984) The social logic of space. Cambridge

### 1.3 | Analysis of the social impact of an intervention in the consolidated fabric of Amoreiras in Lisbon

Nádia Romão



Fig. 12

The goal of this research involves the study of an area within the city of Lisbon, near Amoreiras (Fig. 12), the analysis of its social dynamics and the impact of a regeneration of that part of the city.

Space syntax theory was used for the analysis of both the existing and the proposed urban fabric during all the design phases. The use of this tool allows architects to understand the social life taking place in the area s/he will interview and also evaluate the design solution they will propose. This theory, developed by Hillier and Hanson for over 30 years, examines the relationship between physical space and social life. Space syntax allows analysis at different scales (both global and local) which enable us to understand the behaviors of people when moving in different spaces of complex systems as cities or buildings. With space syntax analysis we will be able to assess the social performance potential of each place. Lisbon needs to reinforce the pedestrian mobility to fight

Fig. 12 - Axial map of Lisbon: integration HH. Credits: Teresa Heitor and João Pinelo

Fig. 13 - Axial map integration HH r3 - analysis of the original

Fig. 14 - Visibility map clustering coefficiente - analysis of the original

Fig. 15 - Axial map integration HH r3 - analysis of the proposal

Fig. 16 - Visibility map clustering coefficiente - analysis of the proposal

Fig. 17 - Time-lapse photography

against the primacy of the automobile traffic which has had a growing importance over the last years. To accomplish this difficult task a strategy that promotes a better balance between the car and the pedestrian is required.

The Amoreiras' area (Fig.12), constructed since the 18th century, is fairly consolidated. Its degradation was immediately recognized and the rehabilitation and revitalization of several blocks was proposed.

The used methodology began with an observation of the area by recording pedestrian movements using counting methods and time-lapse photography. This analysis enabled to understand the social dynamics of that place. Secondly we proceeded to an analysis of the study area using Depthmap tool, with greater focus on the pedestrian situation.

After analyzing the original area and getting some outputs of this study, essentially through the axial map (Fig. 13) we developed some surgical design strategy for its revitalization.

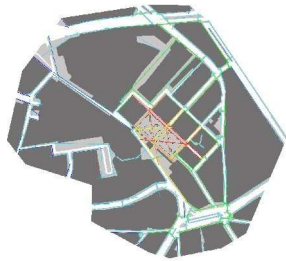


Fig. 13

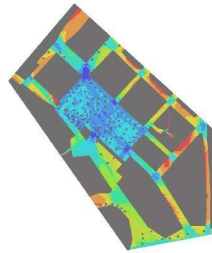


Fig. 14

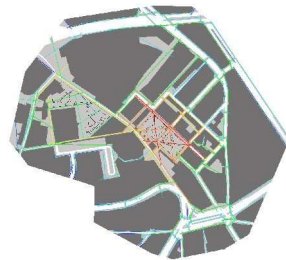


Fig. 15

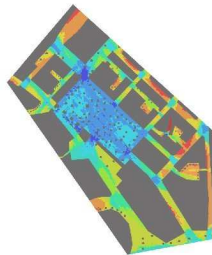


Fig. 16

In these proposals we created new connections through the blocks enabling new crossings to occur. With the use of axial maps it was possible to compare between different crossing possibilities and choose the one with a higher level of integration and accessibility which means that this solution is more likely to produce social movement.

Finally, after choosing the most suitable proposal (Fig. 15), visibility maps were done in order to be able to compare the analysis of the existing with the new layout.

Among the visibility maps that were made both at eye and foot level, the following measures were calculated: connectivity; integration; clustering coefficient; control; controllability and some isovists.

The visibility map where it was found more differences, was the clustering coefficient. In the original analysis (Fig. 14) there was a few red zones and in the proposal (Fig. 16) there are more which means that the new areas, by having a higher



Fig. 17

degree of convexity can attract people there.

As for isovists we tried that the new crossings were linear in order to have an immediate perception of the entire path and therefore a greater perception of the space, since the isovist becomes wider.

The final results were: i) it is possible to create more pedestrian zones (exclusive or not); ii) we should fight against the excessive importance of the automobile giving more choice to pedestrians; iii) "Freedom of choice should be maintained for effective movement around an urban area, but with a bias towards sustainable means of transport – in particular, it is important to ensure that walking is an attractive and viable option." (Corbett, 2004, p. 48).

#### REFERENCES

Corbett, N. (2004) *Transforming cities - Revival in the square*. London: RIBA Enterprises



## 1.4 | Urban configuration aspects of two avenues in Lisbon: Duque d'Ávila and Conde Valbom

Hugo Meneses

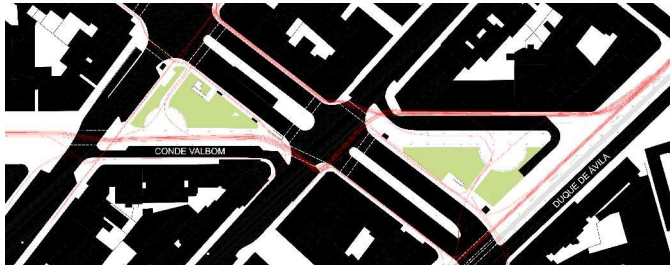


Fig. 18

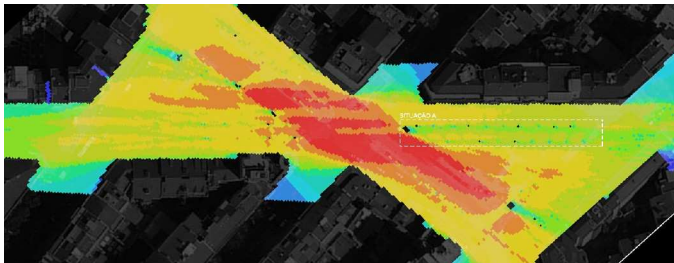


Fig. 19

In this text we analyze some urban configuration aspects of two crossing avenues in Lisbon, Duque d'Ávila and Conde Valbom. Both intersect each other and are located in the large urban area of Saldanha. The first avenue arises as a recently renewed promenade, opened to the public after years of isolation due to construction works for the city subway grid. The second constitutes a consolidated avenue with a few connecting islands to the first one. This study analyzes and explores the arrangement for public space, “the primary generator of pedestrian movement patterns” (Hillier et al., 1992), of both avenues. The investigation was enriched by several observation techniques on the spot and by the use of space syntax’s software Depthmap. After the primary study an intervention project, merely theoretical, surgical and economically sustainable, was proposed.

In Duque d'Ávila the observation included a study of the



Fig. 20

Fig. 18 - Pedestrian flows by local observation

Fig. 19 - VGA graph, visibility

Fig. 20 - Conde Valbom and Duque d'Ávila | Location

Fig. 21 - Conde Valbom | Lateral sidewalk

Fig. 22 - Duque d'Ávila | Pedestrian strip and bicycle lane

present urban model – a road served by a wide and forested pedestrian strip and bicycle lane. As so, I felt the compulsion to witness some of the area’s dynamics, such as pedestrian flows, human behaviors and social activities (Fig. 18). The record of flows were obtained through the counting of how many times a person would pass by minute, a predetermined spot. For that purpose, the avenue was divided in eight portals. In Conde Valbom the pathways and pedestrian flows were registered, especially in the communicating islands between avenues. This data was recorded over three days and in the morning and afternoon period. Both observations were followed and informed by software analysis to axial maps, segment maps, isovists, convex spaces and VGA. In Fig. 18 we observe a distinctive and objective flow streaming centrally through Duque d'Ávila. However, in Conde Valbom we notice a disparity of pathways and flows. The central alameda, in the connection island to Duque





Fig. 21

d'Ávila, lacks a primary and concise path – here the lateral sidewalk is preponderant. This is shown in Fig. 19 and it's due to the fact that the avenues are unstitched by a car access road to an underground parking lot. In situatuion A, dashed white polygon in Fig. 19, we found the big forested sidewalk sporting low connectivity values, contrary to what happens in its laterals. The big red stain between islands shows a place propitious to social encounters.

The study aims is to expose, criticize and exemplify how the use of a space syntax tool, such as Depthmap, enables to reach conclusive and practical results, enunciators of a new urbanism and a new informed and generative process of designing cities.

In the example of this study, it is understandable that the design of a space not informed by its real use and behavior of people drives to a less conquered solution of assumptions and thorough problems of the place, as well as a neglecting of so

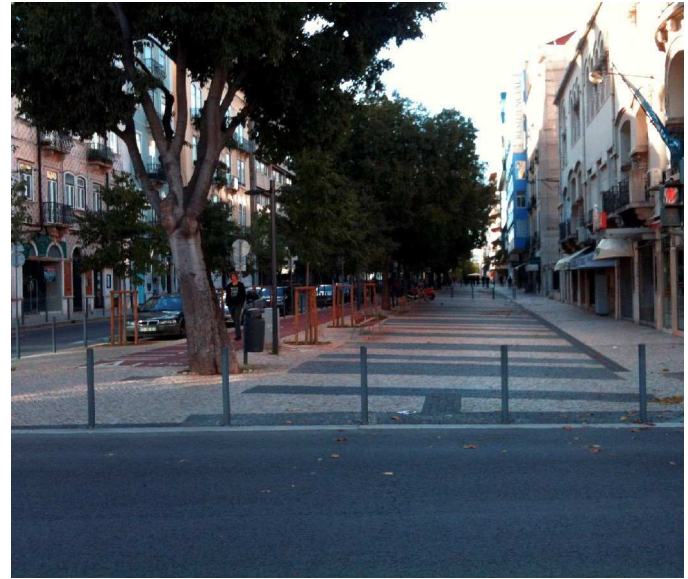


Fig. 22

many other situations likely to have an easy and swift resolution. The fact that Duque d'Ávila was recently renewed limits the obtained results, in the way that the theoretical critique lacks a fair and appropriate time span in wich the city will take its course.

#### REFERENCES

Hillier, B., Penn, A., Hanson, J., Grajewski, T., Xu, J. (1992) Natural movement: or, configuration and attraction in urban pedestrian movement. In *Environment and Planning B: Planning and Design*. Londres, p. 29-66

## 1.5 | Configurational analysis from Praça Duque de Saldanha

Adriana Afonso, Rita Portela

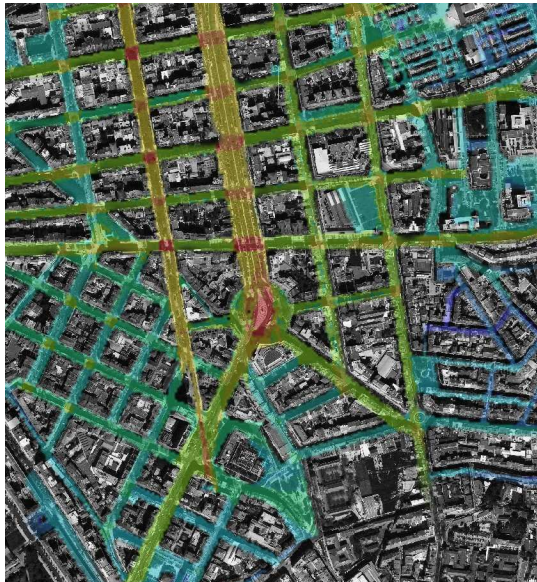


Fig. 23

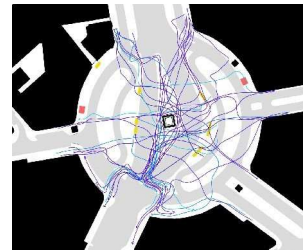


Fig. 24

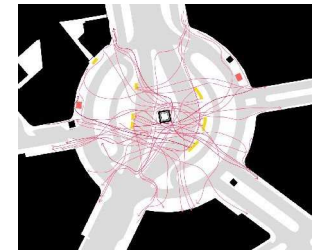


Fig. 25

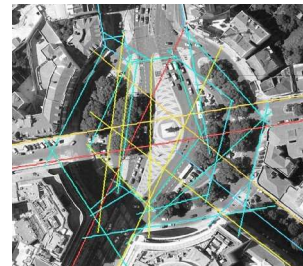


Fig. 26

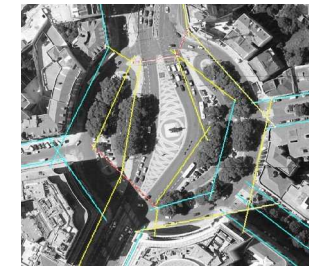


Fig. 27

Praça Duque de Saldanha arises within Lisbon's growth and expansion towards north, with the 1888's plan by the engineer Ressano Garcia developed during a period where cities' salubrity started to become an important issue in the majority of european citites.

The main characteristics identified during the study of this space and acting as weaknesses are: the high automobile flow the conflicts within the pedestrian circulation and the undervalued pedestrian flow.

The traffic's high speed, the high centrality and easy accessibility, the highly changing pedestrian flows were other among the primarily identified characteristics with relevance to this study.

Other relevant characteristics were endowed with a high visibility area over the city and the highly deep radial avenues and streets that converge in the square. Tracking and time-lapse methods were used to achieve a better understanding

of the central roundabout space dynamics.

The records took place and were registered during working days in rush hour, one of them corresponding to the morning period and the other to the afternoon period.

During these records we were able to observe a high number of pedestrian crossings without the use of the available crosswalks and mostly concentrated on the square's central area (Fig. 24, 25).

The tracking results were transposed into an integration axial map named "real" pedestrian crossings (Fig. 26). We concluded that the pedestrian crossings made, only by using the existing crosswalks would be an inadequate situation for that space.

The "real" pedestrian crossings verified, although dangerous to the user, occur associated to the high visibility and as a consequence of the great accessibility potential of the square, as the connectivity and integration HH maps from the VGA



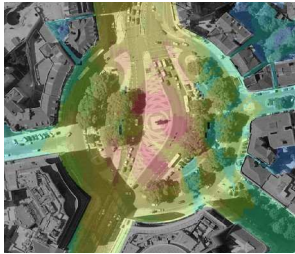


Fig. 28

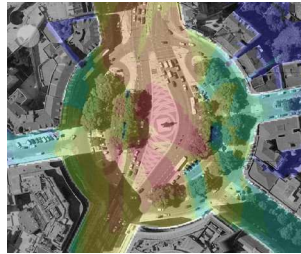


Fig. 29

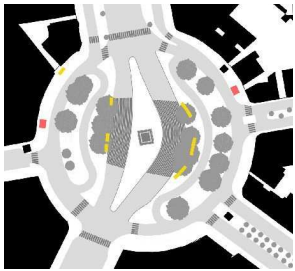


Fig. 30

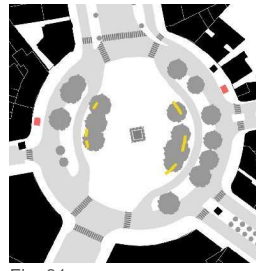


Fig. 31



Fig. 32

analysis show (Fig. 28, 29).

A realistic and inexpensive way to overcome the problems detected during this analysis would be to perform changes in crosswalk positioning and by accepting the configurational physical and social potential of the square center (Fig. 30, 32). This would be a design strategy based on the real pedestrian usage as well as a measure to control the automobile traffic in this area. Another design proposal were studied in which the traffic would be transferred to the limits of the roundabout, leaving the center to the pedestrians (Fig. 31).

Fig. 23 - VGA map of the study area

Fig. 24 - "Real" crossing tracking - morning period

Fig. 25 - "Real" crossing tracking - afternoon period

Fig. 26 - Axial map - "real" pedestrian crossing

Fig. 27 - Axial map - "legal" pedestrian crossing

Fig. 28 - VGA analysis- integration HH

Fig. 29 - VGA analysis - connectivity

Fig. 30 - Proposal 1 - the crosswalk

Fig. 31 - Proposal 2 - the roundabout

Fig. 32 - Simulation of proposal



Fig. 33 - Technologies and city life: evaluating use and assisting people, scenario simulation

## 2 | DIGITAL TECHNOLOGIES: ASSIST, SIMULATE, MAP AND EVALUATE

Sara Eloy, Miguel Sales Dias, Pedro Faria Lopes

Digital technologies play an important role in nowadays society ranging their presence from the daily life of the common citizen to the work of specialized professionals. Technologies, namely Information and Communication Technologies (ICT), have significantly altered the traditional limits and constraints on space and time in cities, and are also changing the spatial organisation systems used by societies. The city, as the place where social networks and the entire complexity of urban life unfold, is now intersected by omnipresent digital networks which people interact with, even without realising that they do so. The digital world is an integral part of our life and complements what we are physically unable to achieve. Even though, the city has not dissolved in the digital era but has instead acquired new ways of supplementing its functions. In Architecture and Urbanism design, digital technologies have been used as tools to evaluate existing places and design solutions and to promote decisions grounded in quantified data. From the early analysis stages to the design itself, from the generation of solutions, responding to *a priori* requirements, and from the simulation to the evaluation of solutions, digital technologies are tools that complement and help the traditional design process.

In this exhibition we were concerned about how technology can help citizens, especially the ones more vulnerable as older people, and how it can be used to map, simulate and evaluate the use and the design of urban spaces where they live. Ambient Assistive Living (AAL) technologies support citizens when carrying out daily tasks by providing a nonintrusive mapping of their behaviors. In this scope the exhibition incorporated a demonstration of some AAL technologies that allow mapping people activities without being intrusive and helping them to have a more autonomous, socially, inclusive and safe life. The aim of AAL applications is to create a perfect balance between residents and home and other places they interact with, helping to improve the level of environmental comfort and offering a series of services that include adequate functions for the various activities that might take place within them, whether associated with work or private life. In technological and social terms, current trends mean that it is

necessary to reassess the concept of residence and the role of technology in housing. Consequently information, knowledge and communication networks have become standard requirements to be implemented in all residential buildings. The importance of understanding urban dynamics is vital to the design process in order to deal with the city flows and act in accordance with them. Techniques of space observation are vast and they look at mapping people's behavior. In response to this need, a new software application was developed to enable an easier and more efficient counting of people when teams are doing local observations. This software was shown in the exhibition and it is now used by students to do observations in urban planning design studios. Architects and urban planners do not work only with the physical space that provides shelter, comfort, quality and security but also with reconfigurable virtual elements. The virtual space is digitized on the basis of the characteristics of real space, which is transformed into virtual environments. In this new context, the virtual world and the concrete world coexist and complement each other. From entertainment to work, healthcare to economics, the emergence of ICT as a knowledge and information mechanism has led to new forms of interaction amongst citizens and between citizens and urban space. In the exhibition, a nuclei with a pocket CAVE (Cave Automatic Virtual Environment) showed immersive virtual reality environments where visitors were able to see i) the affordance of virtual space and its influence on users behavior; ii) how virtual environments may inform designers. The use of immersive virtual reality enables to simulate environments in real scale and to create rich experiences regarding visual, audio, temperature and even tactile sensations. A system like CAVE allows users to interact with a virtual environment and feel they are present in the scenes and therefore allowing researchers and designers to evaluate spatial characteristic and act according to the outcomes. The use of digital technologies' systems are not expected to replace traditional options, but to increase their capacities and add to the range of design options currently available.



## 2.1 | Counting App for local observations and space syntax

Pedro Faria Lopes, Sara Eloy, Tiago Martins, Marco Menino, João Caldas, Flávio Freire

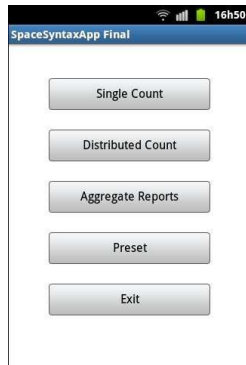


Fig. 34

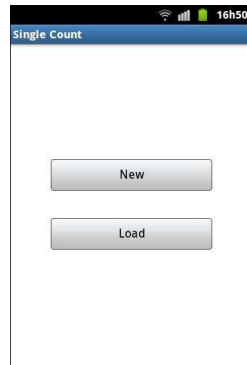


Fig. 35

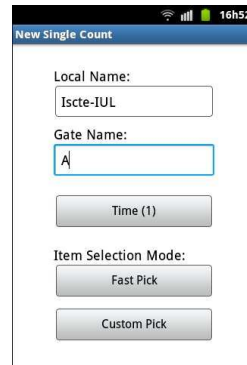


Fig. 36



Fig. 37

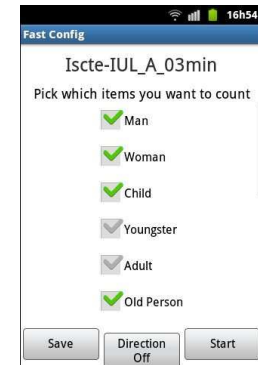


Fig. 38

The *Counting App for local observations and space syntax*, for Android smart phones, was developed to facilitate counting when doing local observations. Instead of using a sheet of paper, the app can be used. The current version was created for the Lisbon Pedestrian Network project. The main functionalities of the app are (Fig. 34): configurable single count and distributed count; creation of automatic reports; possibility to aggregate reports; saving user defined configurations for later use.

A Single Count (Fig. 35) enables the user to start counting in a very fast way, after selecting Local Name and Gate Name (Fig. 36), the Time interval (Fig. 37) and the items to be counted (Fig. 38).

With Distributed Count, a project manager can establish the counting parameters and, through Bluetooth, share the definitions with his/her collaborators.

This is useful when several gates need to be processed

simultaneously at one place.

A predefined list of items (Fig. 38) to be counted can be complemented with the user's own items, available for future use. The items can be used/counted regardless of their direction or a Direction On preset can be applied automatically, accounting for a Left or Right direction when traversing the gate. Items being counted can have a Fast (Fig. 39) or a Custom Pick (Fig. 40) layout.

Each count generates a Report (Fig. 41), sharable using different options (Fig. 42). Reports are organized in the CSV format (Comma Separated Values). This facilitates data use since it can be accessed with any text or spreadsheet editors. Different reports, from the same gate or at different gates, can be aggregated into a single integrated report, also in CSV format. This enables a fast access to all the generated data. With the "paper approach" all data needs to be manually introduced into a spreadsheet, being subject to input errors.

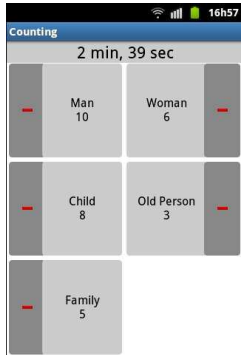


Fig. 39

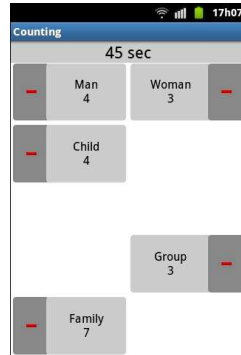


Fig. 40

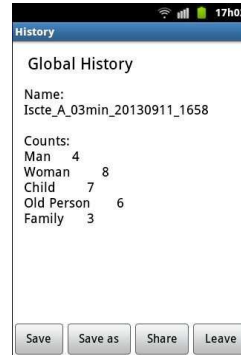


Fig. 41



Fig. 42

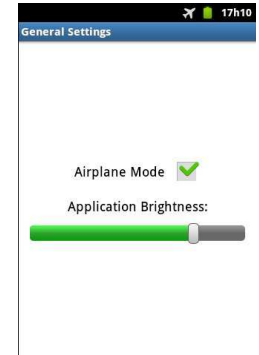


Fig. 43

With the app there is no manual input, the different reports only have to be consistent in terms of the items counted. All reports use an easy name attribution to facilitate future analysis. The file `Iscte_A_03min_20130911_1658.csv` means the count was created at ISCTE-IUL, gate A, for 3 minutes, on 2013-09-11, starting at 16:58 H. This information is also in the report content, along with the items counted.

The Android smartphone is, primarily, a phone. When using the app, a phone call can ruin a count. A safe Airplane Mode (Fig. 43) setting is available to avoid calls. Count operations become safe but no emergency calls can be received. On app exit this mode is reverted.

Using a smart phone at broad day light can drastically affect screen readability. An Application Brightness (Fig. 43) control is available. On app exit the phone's previous brightness state is reset. On app reuse this setting is recovered and used. Brightness affects battery life, the app should be used with a

fresh fully charged battery.

Nádia Romão, MSc Architecture student, said: "The app is very useful, easy to use and much better than using a sheet of paper. The reports also eased the work, enabling me to create graphics with no need to introduce the counts one by one". Several different Android smartphones were tested to ensure cross platform/maker uniformity of graphical interface and interaction. Usability tests were conducted with architecture students and Space Syntax architecture professors. This project was developed over a period of 4 months in the curricular unit of Human-Computer Interaction, Informatics Engineering degree, at ISCTE-IUL, with management and specification by Prof. Pedro Faria Lopes and Prof. Sara Eloy, and development by Tiago Martins, Marco Menino, João Caldas and Flávio Freire.

## 2.2 | CaveH - virtual reality simulation system

Jorge d'Alpuim, Tiago Pedro



Fig. 44



Fig. 45

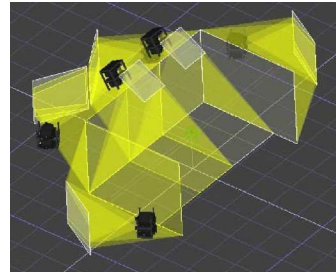


Fig. 46

Fig. 44 - Photo taken at CAVE at Lousal (photo by Ana Moural)  
Fig. 45 - May 10th, 2008. CAVE - Lousal (photo by Pedro Faria Lopes)

Fig. 46 - CAVE at Lousal projection infrastructure  
Fig. 47 - Screenshot taken from landscape in solar system simulation with CaveH  
Fig. 48 - Screenshot taken from ISCTE-IUL model's 2nd courtyard simulation with CaveH

Virtual reality environments are a powerful tool to materialize any idea we might have into the virtual world, either a realistic idea or the most mind-blowing, fantastic and unreal scene. While using this technology, it is possible to experience the rich audio-visual contents created in several different VR systems which differ by the sense of immersion the users can feel.

The CAVE (Cave Automatic Virtual Environment) at Lousal (Fig. 44) is a large-scale immersive VR system which comprises six projection planes (two front, two floor, one left and one right planes), where each visual content is projected by a pair of stereoscopic high-resolution projectors. This system is distributed in a U-topology, with dimension of 5,6 x 2,7 x 3,4 meters, creating a wide field of view ( $> 180^\circ$ ) and provides a realistic aural experience by the 7:1 3D sound system. The PocketCave system at ADETTI-IUL is a small and portable configuration of a CAVE system with only one

projection plane. It provides a semi-immersive VR experience in a high-resolution stereoscopic projection, with 3,2 x 2,1 meters width and a 5:1 surround sound system.

Taking advantage of this technology is a new powerful opportunity for architectural design since it provides the chance to stand, semi-immersed and in real scale, within the created and idealized space and interact with the elements contained in it. Our CaveH software, developed to support our CAVE system, provides an easy and fast way to import the models created in the architects' 3D modelling software into our software to be simulated in the VR system. The whole process has to pass through the Blender software integration phase, since it provides the tools to define the behaviour that each 3D element will have while in simulation time, at CaveH software. This intermediate phase is a small effort to bring the created spaces into an immersive, real-scale, high-resolution and 3D experience.



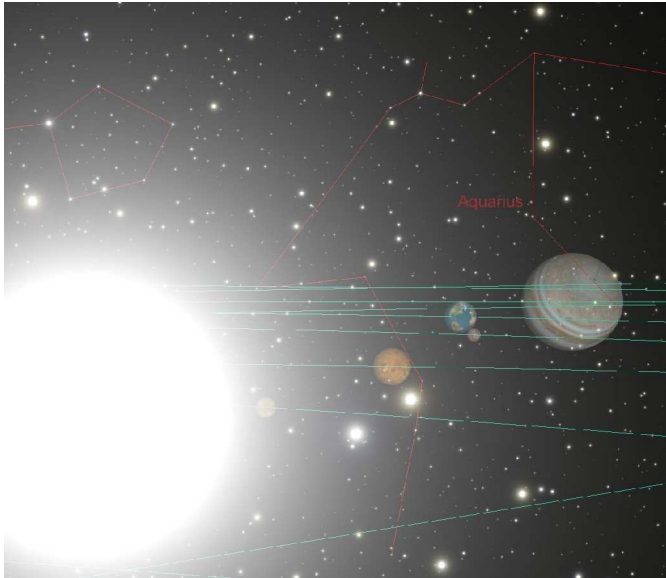
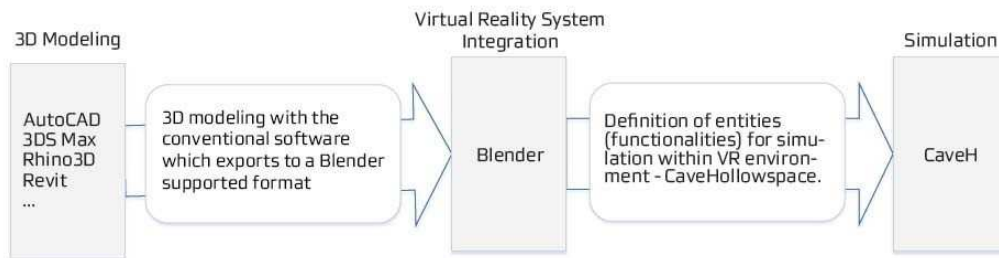


Fig. 47



Fig. 48



More information at  
<http://lousal.cienciaviva.pt/exposicoes/grutavirtual/>  
[http://istar.iscte-iul.pt/index.php/Digital\\_Living\\_Spaces](http://istar.iscte-iul.pt/index.php/Digital_Living_Spaces)  
 See images at  
<http://www.flickr.com/photos/iscteiuil/sets/72157630205722838/>

## 2.3 | Immersive virtual reality as an architectural tool

Ana Moural



Fig. 49

Technology has become an imperative tool in almost all human activities. This is true even for the more traditional professions known. However, some areas, like architecture, are not yet fully exploring all the potentialities given by technology, especially in the process of architectural design. Virtual Reality (VR) and Immersive Virtual Environments (IVE) arise as a complementary tool, to the broadly used scale models. These new technologies are essential tools to experiment the tridimensionality of space and, especially IVE, enable to optimize the perception of space comparing to other VR technologies. Using more complex shapes in architecture VR has even larger advantages since it enables to do easier and more comprehensive 3D models of the buildings. IVE can be used to simulate the space before it is built and that is done in real scale, so users can see, choose and walk through different spaces in real time, giving them a better perception of what the final architectural solution will be.

“Hardly anything in VR is like in reality, however VR can be used to project a certain part of reality. (...) Similar to the mental “concept”, most properties of the things can’t be perceived visually in reality. VR offers a chance to develop a visual representation of properties.” (Kieferle & Wossner, 2001)

However according to Kieferle and Wossner's (2001) opinion, the more realistic experience of space make it possible to fail sooner and find better solutions since it gives designers a better knowledge of the space.

A MSc dissertation has being carried out with the goal of clarifying the process to create an Immersive Virtual Environment in ADETTI-IUL's PocketCAVE. This process goes from the 3D modelling process, to its customization in the navigation software: the CaveH Spawner, using the PocketCAVE physic structure.



Fig. 50



Fig. 51



Fig. 52

**Fig. 49** - Amoreiras hill and its relation with the axis Avenida Engenheiro Duarte Pacheco and one of the most important Lisbon's square, Marquês de Pombal

**Fig. 50** - Street view near Vila Raul - photo

**Fig. 51** - Street view near Vila Raul - CaveH screenshot

**Fig. 52** - Street view near Vila Raul - CaveH screenshot

The model presented during the exhibition is a partial model from the design assignment done at the Final Project of Architecture Course. The place to be redesigned, Vila Raul, is part of Amoreiras' hill in Lisbon, near to Avenida Duarte Pacheco.

“VR can and should be used from the very beginning of a project, the conceptual phase, to the final planning stage, even for marketing or event planning. (...) The main benefits which were to be quantified in a research project were: reduction of planning time, more security in the planning decisions, finding and eliminating of problems already in the planning phase, better interprofessional cooperation and better prepared presentations for the decision makers; and thus better decisions.” (Drosdol et al, 2003)

This work enabled to give the academic and architectural practice community access to this tool both considering architecture design and graphic computation areas of research and practice.

#### REFERENCES

- Kieferle, J., Wössner, U. (2001) Showing the invisible: Seven rules for a new approach of using immersive virtual reality in architecture. Process [19th eCAADe Conference Proceedings] Helsinki, 29-31 August 2001, pp. 376-381
- Drosdol, J., Kieferle, J., Wössner, U. (2003) The Integration of Virtual Reality (VR) into the Architectural Workflow. Process [21st eCAADe Conference Proceedings] Graz, 16-20 September 2003



Fig. 53 - Living Lab Xbox Room, Microsoft Lisbon, Ambient Assistive Living technologies in the scope of project QREN AAL4ALL

### 3 | AMBIENT ASSISTED LIVING

Miguel Sales Dias, Sara Eloy

The Portuguese and European population is ageing, a factor that has drawn attention to the need to provide the city, the buildings and housing in general with features designed for universal use. According to the *Instituto Nacional de Estatística* (National Statistical Institute), this marked ageing of the population is one of the most striking aspects of recent demographics trends (Eloy, 2012).

In the census of 2001, for the first time, the proportion of older people, aged 65 or over (16.4%), exceeded that of young people, aged 0 to 14 (16.0%). It has been estimated that in 2050 almost 33% of the Portuguese population and 16% of the world population will be aged over 65. This demographic trend will be accompanied by the increase of people with physical limitations.

Factors such as smaller-sized families and higher life expectancy indicate that in the near future, many more older people will live alone. They will not have the traditional family support and they will need to make use of external structures to obtain health care and other forms of assistance, which will have implications in the structure of the health care system. (Eloy, 2012)

QREN AAL4ALL (<http://www.aal4all.org/>) is a collaborative research project that aims at developing Ambient Assisted Living (AAL) technologies for the older and people with reduced mobility, to enable them to live with more independence, mobility and safety. This project looks at the mobilization of a Portuguese industrial ecosystem of products and services in the scope of AAL, and focus on the definition of specific standards (Vardasca et al, 2012) to be adopted by such products and services.

Some of the technologies that are being developed in the scope of this research aim at monitoring, preventing social isolation, increasing safety and localizing users. The use of these technologies look at the demographics trends enabling older people to access technological means to obtain health care and other forms of assistance.

The adoption of monitoring simple-to-use sensing devices (gathering biometrical data, location data, temperature, among

others) embedded at e.g. the user's clothes (shoes, t-shirt, chest bands), and remotely monitored via internet services, mobility apps and TV set-top boxes have an important impact at the citizens monitoring and at future planning strategies for the city. The data collected, with due consent, from those devices includes vital information regarding people's behaviour, which enable e.g. the rethinking of the social network of health care facilities and social security services for the elderly and the understanding of pedestrian flows, as well as data regarding the city itself (temperature, pollution, humidity, among others).

AAL4ALL technologies enable to map different aspects of the cities life that can in different ways inform design strategies in different ways.

QREN AAL4ALL consortium is coordinated by Microsoft and includes the following co-promoters: CCG/ZGDV; Fraunhofer; Be Artis; CASO; CeNTITVC; CITEVE; Conforto em Casa; CRITICAL HEALTH; Escola Superior de Educação de Paula Frassinetti; EXATRONIC; FCTUNL; Glintt HS; INESC Porto; INOV - Inesc Inovação; INOVAMAI; ISCTE-IUL; INTELLICARE; IPN; ISEP; OPTIMUS; PLUX.; Portugal Telecom Inovação; PROCESS.NET; UBI; UA; UM; FEUP.

#### REFERENCES

Vardasca, R; Ferreira, L; Simões, R (2012) "Needs and opportunities in Ambient Assisted Living in Portugal", in proceedings of: 2nd International Living Usability Lab Workshop on AAL Latest Solutions, Trends and Applications - AAL 2012  
Eloy, S (2012): "A transformation grammar-based methodology for housing rehabilitation". PhD thesis, Instituto Superior Técnico, Universidade Técnica de Lisboa.



### 3.1 | Wi-fi indoor positioning solution

Adriano Moreira, Antero Salgado, Filipe Meneses, João Peixoto, Samih Eisa

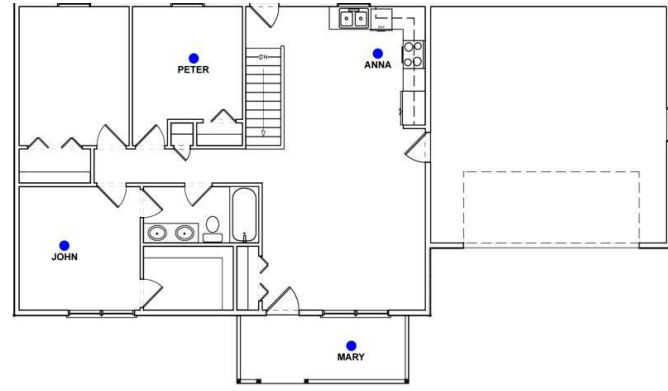


Fig. 54 - Visual indoor position of users

Positioning and location information is important for many activities and businesses. GPS – Global Positioning System is the most popular positioning technology used worldwide. It provides the devices position in a well-known referential and it is today used for many different activities: car tracking, fleet management, outdoor sports activity tracking, containers tracking, car navigation systems, among others.

GPS systems do not work indoor since receivers need to have a direct line of sight to GPS satellites. However, indoor location is very important for many different activities. For example, indoor location allows tracking a package in a warehouse, to locate a doctor in a hospital, to easily find important equipment in a lab or to promptly know where to forward an important phone call since the location of the called person can be determined immediately.

We have developed a complete Wi-Fi Indoor Positioning Solution. Wi-Fi networks exist in almost all the buildings and can be used to localize any Wi-Fi enabled device. By using complex algorithms over the Wi-Fi fingerprint radio signals the location can be computed with a high accuracy. To track a person we just need to ask him/her to wear a small Wi-Fi tag. Location is provided has a pair of coordinates and also in a more human friendly way, providing the building, floor and room identification.

Important facts: no need to install a specific infrastructure; it uses the current Wi-Fi network; works with Wi-Fi tags; works with Wi-Fi enabled Android mobile phones; provides real-time location; high accuracy (including floor detection); based on standard protocols; pervasive.

#### BIBLIOGRAPHY

Samih Eisa, João Peixoto, Filipe Meneses, Adriano Moreira, “Removing Useless APs and Fingerprints from WiFi Indoor Positioning Radio Maps”, paper submitted to IPIN’2013 – Fourth International Conference on Indoor Positioning and Indoor Navigation, France, October 2013

Filipe Meneses, Adriano Moreira, “Large scale movement analysis from WiFi based location data”, in Proceedings of The 3rd International Conference on Indoor Positioning and Indoor Navigation (IPIN’2012); Sydney, Australia, 12-15 November 2012, ISBN 978-1-4673-1955-3.

Nelson Marques, Filipe Meneses e Adriano Moreira, “Combining similarity functions and majority rules for multi-building, multi-floor, WiFi Positioning”, in Proceedings of The 3rd International Conference on Indoor Positioning and Indoor Navigation (IPIN’2012); Sydney, Australia, 12-15 November 2012, ISBN 978-1-4673-1955-3.

Karolina Baras, Adriano Moreira, Filipe Meneses, “Navigation Based on Symbolic Space Models” (full paper), in proceedings of the 2010 International Conference on Indoor Positioning and Indoor Navigation (IPIN), Mautz, R., Kunz, M. and Ingensand, H. (eds.), IEEE Xplore, 971 p. IEEE Catalog Number: CFP1009J-ART ISBN: 978-1-4244-5864-6. Zurich, Switzerland, pp. 1-5, 15-17 September, 2010.

### 3.2 | Kshirt

Raquel Sousa, Johan Benesch, Gil Gonçalves



Fig. 55

Fig. 55 - View of the shirt with the attached device

Fig. 56 - Device viewed from various angles



Fig. 56

The Kshirt is a low cost sensor which allows monitoring of various vital signs such as heart rate, temperature, respiratory rate and ECG signals. To allow for greater comfort the sensor is incorporated in a t-shirt that uses smart fabrics to make the measurements. The electrodes (sensors) are thus woven into the fabric of the shirt. Attached to it is a device that performs signal processing and sends data to the elderly's smartphone. The K.shirt device collects real-time data and sends it via Bluetooth to the elderly's smartphone/tablet.

The smartphone has a software that performs analysis of the data. The smartphone can in turn send alerts to the caregivers in case the elderly has an episode, e.g. a sudden heart problem is detected from the analysed data. Via the smartphone the elderly can monitor his/hers own health status, receive from the caretakers reminders about medical visits, plan physiotherapy and receive alerts when it is time to take medication, etc. The system also allows a health professional

or an informal caregiver (e.g. a son) to remotely monitor the health status and vital signs of the elderly, either via their smartphones/tablets or a web platform. The system can be extended to include other sensors (e.g. blood sugar and oxygenation via additional wearable sensors, and movement and location via sensors of the smartphone, etc). With the K.shirt and IT support tools (smartphone and web platform) the elderly can keep in touch with family and informal caretakers, day centres, hospital and anywhere else that makes part of his/her daily routine. Thus the system is designed to make it easier for the elderly even with health problems, pushing the boundaries of creative belief, to continue to have an active and social life.

### 3.3 | Caretaker application

Cláudia Peixoto, Filipe Sousa, Luís Carvalho

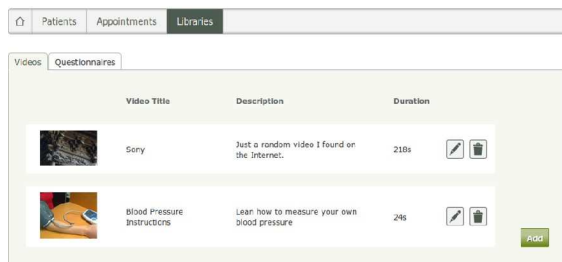


Fig. 57

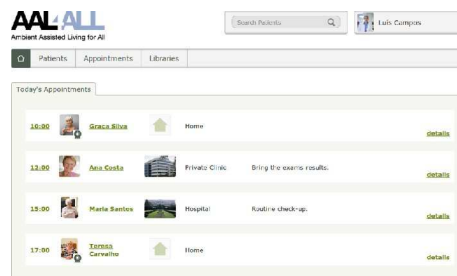


Fig. 58



Fig. 59

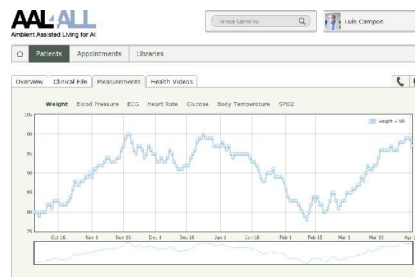


Fig. 60

Fig. 57 - Questionnaires available to be answered by seniors  
 Fig. 58 - Senior's overview  
 Fig. 59 - Video tutorials available to be watched by seniors  
 Fig. 60 - Senior weigh measurements

Developed societies are currently facing severe demographic changes: the world is getting older at an unprecedented rate. In 2000, about 420 million people, or approximately 7% of the world's population, were aged 65 or older. By 2050, that number will be nearly 1.5 billion people, about 16% of the world's population. This demographic trend will be also followed by an increase of people with physical limitations. New challenges will be raised to the traditional systems of health care, not only in Portugal, but also in all other European states. There is an urgent need to find solutions that allow to extend the time people can live in their preferred environment by increasing their autonomy, self-confidence and mobility. The AAL4ALL project presents an idea for an answer through the development of an ecosystem of products and services for Ambient Assisted Living (AAL) associated to a business model and validated through large scale trial.

- Functionalities:
- Electronic Care Record (ECR): information available in a portal for caretakers/seniors; caregivers define monitoring rules (used sensors and measurements frequency); alarms defined by caregivers based on predefined rules
  - Educational Videos: caregivers can recommend videos to the users (seniors)
  - Check/Schedule appointments
  - Check patient status and vital signs
  - Access patient clinical history
  - Receive alerts when patients have problems: per-patient; caretakers define thresholds
  - Vital Signs: discrete measurements (weight, blood pressure); continuous monitoring (ECG sessions); can easily be extended to any other data type (videos); video library with tutorials, wellbeing videos
  - Questionnaires: library with questionnaires





## 4 | EXHIBITION

Maria Rosália Guerreiro, Miguel Sales Dias, Pedro Faria Lopes, Sara Eloy



The exhibition was organized according to four different sections:

### # 1 – Close – Lisbon street network

Large model of Lisbon highlighting its natural relief, the network of ridge and valley lines and the network created by Lisbon's main public spaces.

### # 2 – Closer – Lisbon's public spaces

Research analysis of the existing public spaces and of the design proposals for their renovation according to space syntax analysis and other observation techniques. Outputs of the research Project Lisbon Pedestrian Network and works developed at the courses of Space Syntax and Complexity, Urban Project III and Final Project of Architecture were exhibit.



### # 3 – The closest – Mapping people

- demonstration of a new software application that was developed to enable an easier and more efficient counting of people when teams are doing local observations;
- demonstration of some ambient assistive living technologies that allow mapping people activities without being intrusive and helping them to have a more autonomous life.

### # 4 – Enclosed – immersive real virtual environment

A nuclei with a pocket CAVE (Cave Automatic Virtual Environment), 3D models about ISCTE-IUL campus and of a Lisbon urban area in Amoreiras (Ana Moural). Visitors were able to see:

- the affordance of virtual space and its influence on users behavior;
- how virtual environments may inform designers

Photos in this section by Hugo Cruz

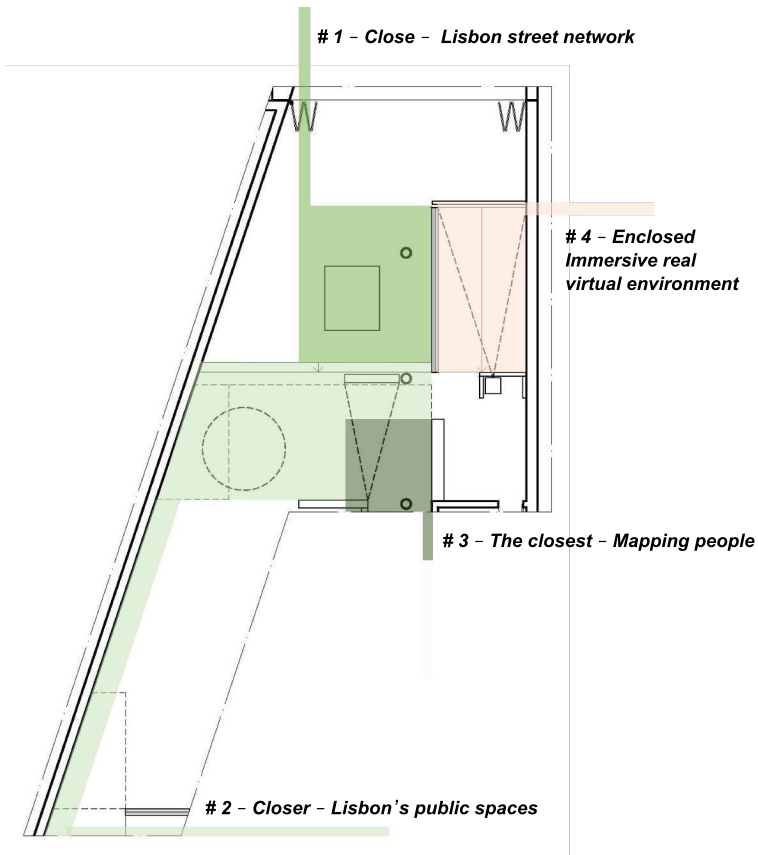


Fig. 61 - Exhibition plan







The present book provides an overview of the work presented in Sep/Oct 2013 at an exhibition carried out in ISCTE-IUL under the theme CLOSE to cities and CLOSER to people in the scope of Lisbon Architecture Triennale 2013.

The exhibition was an opportunity to focus the research work developed within Architecture, Urbanism, Information Technologies and Computer Graphics areas and discuss cities as self-organized networks.

The aim of the exhibition was to create a complementary event in the Lisbon Architecture Triennale 2013 programme that illustrates an overview on the plurality of digital spatial practices by architects and researchers on important and current issues affecting cities in the world, namely placemaking, ageing population and civic engagement.