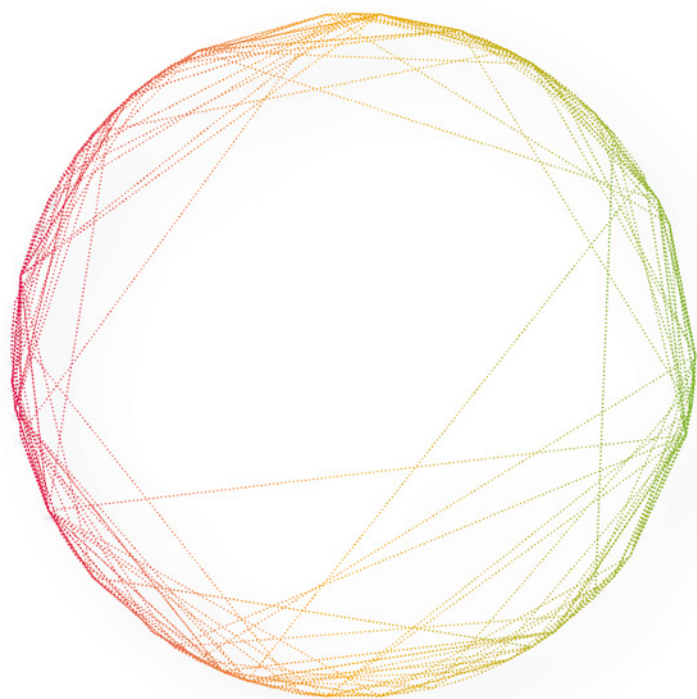


# Global Dwelling

Intertwining Research,  
Community Participation  
and Pedagogy



**Edited by**  
**Leandro Madrazo**

## **Global Dwelling**

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L. Madrazo

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# **Lisbon Workshop: Contemporary Living Patterns in Mass Housing in Europe**

**Alexandra Paio, Sandra Marques Pereira,  
António Brito Guterres, Vasco Moreira Rato**

## INTRODUCTION

The goal of the first OIKONET International Workshop which took place at ISCTE-IUL, in Lisbon, from July 14 to 19, 2014, was to examine the suitability of existing housing for current social and individual needs. The learning activities focused on two neighbourhoods in Lisbon, each one representing a housing pattern, formal and informal: Portela de Sacavém, a housing estate designed by Fernando Silva and built in the 1960s and 70s which then became a model for other housing estates; and Bairro da Liberdade, a self-constructed settlement which emerged around the same period.

The co-existence of informal and formal architecture is a global phenomenon manifested in many cities around the world. Informal settlements arise as survival mechanisms to answer the housing shortage and are built by the occupants themselves. On the other hand, the housing estates built during the twentieth century attempted to solve the housing shortage with the uniform repetition of standardized housing units for standard families. However, the subsequent social and economic developments have made these standardized solutions obsolete. Consequently, mass housing programmes based on the principles of modern architecture fell into disrepute and began to decline. In contrast, informal mass housing is now seen as a good model for living because it fosters diversity and it facilitates a bigger sense of appropriation and identification of the dwellers with their living place (Hernández, Kellett, & Allen, 2010).

A comparative study of these two housing patterns might help to reveal the advantages and the drawbacks of each one. Thus, it would then be possible to develop structured ways of cross-influencing both patterns in order to promote new housing design solutions. The contemporary social, economic and technological transformations in Europe demand more flexible housing design strategies that consider dwelling as a process, rather than a mass produced object (Hamdi, 2011). In this context, user-designed housing methods seem more capable of providing the flexibility and greater sense of appropriation and identification that dwellers demand (Donath & González, 2006). The complexity that underlies housing issues and the current economic restrictions call for new approaches. Advances in design and production using digital technologies can help to face these challenges. Building components can now be mass customized to respond to local conditions (Kolarevic, 2005). Computer assisted design-to-fabrication workflows have emerged as a possible solution to produce sustainable buildings at a global scale. Today, versatile customized modular construction systems which are socially, economically and environmentally sustainable are possible thanks to the digital fabrication process. Computer Numeric Control (CNC) machinery makes it possible to design and build a house adapted to the demands of the occupants.

Considering these current trends in housing, the Lisbon workshop aimed at providing answers to these two main questions: Do architects need to learn from informal housing? And, do we need to make a more social-oriented use of the technologies at our disposal? To address these questions, it is necessary to cut across specific disciplinary boundaries to address the problem of housing from a multidisciplinary perspective which integrates architecture, sociology, and technology. Furthermore, new architectural design methods and learning strategies are necessary to foster collaborative processes which bring together multiple actors and disciplines.

By putting together all of these issues underlying contemporary housing—demands for greater participation of dwellers, exploitation of available digital technologies to create mass customized houses—the Lisbon workshop offered an opportunity to carry out a pedagogic experiment on global housing.

#### LEARNING DESIGN

Through the workshop activities, learners were confronted with a complex set of issues which determine contemporary housing and living patterns, structured in four themes: Participatory Processes, Home and Social Change, Energy Efficiency and Construction Materials, and Computational Design (CAD/CAM tools).

- *Participatory Processes* play a key role in today's democratic societies. Since the 1960s there has been an increasing demand to involve inhabitants in the process of shaping their physical environment. Today, it is widely acknowledged that housing design needs to include users' experiences in the decision-making process. Fostering the relationship between inhabitants and their built environment is fundamental to create a sense of belonging. According to Sanoff (1985):

All designers who are concerned with improving the quality of their efforts and the quality of everyday life should consider participation through user involvement. (...) Participatory design is advantageous in that it increases people's awareness of the consequences of the decisions that are taken.

In practice, participation implies to move away from a traditional client-centred process to one focusing on the dweller's needs and aspirations.

- *Home and Social Change* looks at the social transformations and changes which occurred during the twentieth and early twenty-first centuries that are bringing about new ways of living. Family structures and living patterns are embedded in housing forms and spaces. According to Eleb (1996, p. 46):

More and more it becomes necessary to work on the distribution in order to propose spaces better adapted to the new forms of domestic groups (cohabitation for example), to the modes of interaction between people that are evolving. One must reflect as well, on adapting the home to the present-day rhythms of daily life, on the forms of relaxing, of work and of consuming in mutation.

- *Energy Efficiency and Construction Materials* strongly influence the environmental sustainability of housing buildings. As Schlueter and Thesseling state (2009, p. 153):

Due to the increased awareness of energy consumption and related CO<sub>2</sub> emissions, building regulations such as the European Buildings Directive in Europe, Minergie in Switzerland, or programs such as LEED in the USA have been established over the last years. Architects and planners are increasingly forced to consider energy consumption and the environmental impact of their building designs. (...) It is widely acclaimed that the most important design decisions concerning building sustainability have to be made in the early design stages. (...) In common architectural practice however, performance analysis to support design decision-making is only used for the few buildings facing engineering challenges or explicitly focussing on sustainability. The lack of integration into the design leads to extensive modifications afterwards to meet performance criteria.

- *Computational Design* techniques, such as parametric design and rapid prototyping, can provide novel housing design and construction solutions. The increasing availability of advanced computer modelling programs and digital fabrication machines enables the design and construction of housing units adapted to a specific programme (site, materials and budget).

These four themes were intertwined in the design process carried out during the workshop. The process started with an exercise in participatory design involving residents and ended with the construction of housing prototypes using digital fabrication techniques and wooden panels. In this design-through-production process, participants were challenged to rethink the concepts of living addressing the inhabitants (Paio, 2014).

## LEARNING IMPLEMENTATION

Following a pedagogic methodology previously developed in the OIKODOMOS project (Madrazo, 2011), before the beginning of the workshop, participating students and teachers carried out some preparatory activities to acquaint themselves with the topics to be addressed during the workshop and with the study areas. This preparatory work was done



using the on-line learning environment OIKODOMOS Workspaces. The preparatory learning activities encompassed the various themes of the workshop programme. By means of recorded video lectures, maps, plans and photographs, students were able to understand the historical, sociological and morphological characteristics of the two sites. The students presented the outcomes of the preparatory activities at the start of the workshop in Lisbon.

The activities carried out in the one-week workshop included site visits and meetings with residents, lectures by experts and local representatives, field studies, and design studio work including the construction of a full-scale housing prototype with digital fabrication techniques. Students met with citizens and visited the two housing developments which had to be upgraded and adapted to current needs. Introductory lectures on the four thematic blocks—Participatory Processes, Home and Social Change, Energy Efficiency and Construction Materials, and Computational Design—gave students the basic theoretical background. They were followed by thematic studios dedicated to each of the four themes:

- In “Participatory Processes” the studio objective was to analyse relationship between physical and social dimensions in the two housing areas. In the field work, students identified users’ needs, talked about their everyday living experiences and analysed how these could be part of the design process.
- In the theme of “Home and Social Change” the objective was to understand the influence of social dynamics on residential architecture. Housing organization and form change over time reflecting the evolution of prevailing social perceptions and values regarding the concepts of family and private life (Pereira, 2013). Since the beginning of the twentieth century, two main ideal family types can be sequentially distinguished in Western societies (Roussel, 1992): A traditional model characterized by hierarchy, roles, gender division anchored in male power, formality and institutionalism; and a modern one, characterized by the deepening of the democratic relations among its members, the growth of informality and individualization as well as the reducing influence of the institutions in the individual behaviour. Likewise, the evolution of housing patterns confirms that family types can be better understood through the changes of dwelling configuration. In fact, it may be contended that modern housing is the formalized expression of a modern family ideal. However, it should be noted that the evolution of family types as well as of dwellings is quite complex, and that the transition from tradition to modernity is not shaped by rupture. At present, two of the main problems of Portela are the ageing of the original residents and the need to attract new inhabitants. How to adapt the existing housing to the new reality was the purpose of the exercise developed by the students.

- “Energy and Construction Materials” are essential to achieve energy efficiency on residential buildings. Students received training to calculate the embodied energy and the carbon footprint of construction components in order to evaluate their environmental impact. For this purpose, they used the University of Bath’s Inventory of Carbon and Energy (Hammond & Jones, 2008) and a spreadsheet-based calculation tool developed at ISCTE-IUL. This methodology is not as detailed as other Life Cycle Assessment (LCA) methods and tools but it provides a simple and effective way of estimating environmental sustainability of construction elements (Ashby, Ball, & Bream, 2011; Ashby, Miller, Rutter, Seymour, & Wegst, 2012).
- “Computational Design” thematic studio gave students an overview of the new challenges raised by the digital revolution (Kolarevic, 2005). Digital manufacturing processes and fabrication technologies were presented and the advantages and disadvantages of the CAD/CAM technologies in providing socially and economically sustainable customized solutions were discussed. The application of CAD/CAM techniques and physical computing processes, from the conceptualization phase (sketch and 3D modelling with generative and parametric parameters) to digital fabrication, implementation and product assembly, were introduced. CAD technologies (Rhinoceros and Grasshopper plug-in) were used to generate design variations. The participants fabricated a small section of a full scale prototype to learn how to use subtractive procedures in a CNC milling machine.

The knowledge acquired in the four thematic studios was incorporated into the design studio work. Students developed solutions with customized prefabricated wooden panels to upgrade the housing in the two neighbourhoods, Portela and Liberdade. At this stage, the work was done by teams made of students from different schools to foster the exchange across countries, cultures and educational programmes. Teachers from OIKONET institutions followed the assignments, supervised the evolution of the design proposals and acted as design critics in the final presentation of the studio work. The students were frequently asked to evaluate whether their design proposal would be flexible and adaptable in order to suit several distinct household demands. The final step of the design studio was to construct a full class prototype with digital fabrication.

During the workshop, all the results of the tasks carried out were posted on an on-line public platform<sup>1</sup> and in OIKODOMOS Workspaces.<sup>2</sup> Hence, these materials were available to the participants as a knowledge resource.

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1. See [oikonet-lisbonworkshop.blogspot.pt](http://oikonet-lisbonworkshop.blogspot.pt)

2. See [www.oikodomos.org/workspaces/contemporary\\_living\\_patterns](http://www.oikodomos.org/workspaces/contemporary_living_patterns)

## Students' Proposals

The proposals presented by the students at the end of the workshop exemplify the interweaving of the four topics introduced in the workshop. Diverse housing solutions were proposed and partially materialized in the full scale prototype, all of them based on the same modular construction system, which was adapted to the specific conditions of the programme.

### PORTELA DE SACÁVEM: RENOVATION PROPOSALS

The Portela housing estate is located in the northeast of Lisbon. It houses 4.500 dwellings in less than 1sqkm, with building blocks of a few types organized around a central core where a shopping centre and other public facilities are located. The majority of Portela's buildings were completed between 1973 and 1979. The housing units were designed for the first occupants who arrived at that time: rising middle-class families coming either from the ex-colonies or from the city of Lisbon. Since then, the profile of the inhabitants has changed. At present, two of the main problems of Portela are the ageing of the original residents and the need to attract new inhabitants. How to adapt the existing housing to the new reality was the purpose of the exercise developed by the students.

The four projects developed by students explored customized housing solutions adapted to the needs of today's dwellers. The proposals aimed at providing answers to problems such as an ageing community, the lack of common spaces, and the transformation of the dwellings over time.

- *Adaptable Living* aims at making the existing apartments attractive to younger dwellers. The structural components of the existing dwellings, the external walls and the location of wet areas are preserved. With this fixed structure, rooms and services can be placed in different ways. A kitchen can be easily replaced by a bathroom by removing panels. A one-bed apartment can be transformed into a three-bed one. Semi-private spaces can be added to the façade to expand the inner spaces and provide a place which can be used as a playground or as a terrace, thus promoting social interaction (Figure 1).
- *S.I. Box* proposes to separate the existing layouts in three zones: A central one for shared spaces, a semi-private one for services and a private one for the rooms. Modular units are embedded in the existing blocks to expand the dwellings with new spaces which can be used as shared kitchens and terraces. In this way the project aims at solving some of the problems of the blocks: The dark staircases, and the small rooms within large apartments (Figure 2).

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