International Journal of Architectural Research
An international fully refereed journal published three times a year

Architecture
Planning
Built Environment Studies

Chief Editor
Ashraf M. Salama

Collaborating Editors
Farzad Pour Rahimian
Remah Y. Gharib

Includes
- Original Research Articles

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EDITORIAL: ADVANCING THE DEBATE ON ARCHITECTURE, PLANNING, AND BUILT ENVIRONMENT RESEARCH

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PREAMBLE: THE ROAD AHEAD

With an acceptance rate that does not exceed 25% of the total papers and articles submitted to the journal, IJAR – International Journal of Architectural Research is moving forward to position itself among the leading journals in architecture and urban studies worldwide. As this is the case since the beginning of volume 5, issue 1, March 2011, one must note that the journal has been covered by several data and index bases since its inception including Avery Index to Architectural Periodicals, EBSCO-Current Abstracts-Art and Architecture, INTUTE, Directory of Open Access Journals, Pro-Quest, Scopus-Elsevier and many university library databases across the globe. This is coupled with IJAR being an integral part of the archives and a featured collection of ArchNet and the Aga Khan Documentation Centre at MIT: Massachusetts Institute of Technology, Cambridge, MA.

In 2014, IJAR was included in Quartile 2 / Q2 list of Journals both in ‘Architecture’ and ‘Urban Studies.’ As of May 2015, IJAR is ranked 23 out of 83 journals in ‘Architecture’ and 59 out of 119 in ‘Urban Studies.’ Rankings are based on the SJR (SCImago Journal Ranking); an Elsevier- SCOPUS indicator that measures the scientific influence of the average article in a journal. SJR is a measure of scientific influence of scholarly journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where such citations come from. See here for more information (http://www.scimagojr.com/index.php) and (http://www.journalmetrics.com/sjr.php). While the journal is now on top of many of the distinguished journals in Elsevier- SCOPUS database, we will keep aspiring to sustain our position and move forward to Q1 group list and eventually in the top 10 journal list in the field. However, this requires sustained efforts and conscious endeavours that give attention to quality submissions through a rigorous review process.

This edition of IJAR: volume 9, issue 2, July 2015 includes debates on a wide spectrum of issues, explorations and investigations in various settings. The issue encompasses sixteen papers addressing cities, settlements, and projects in Europe, South East Asia, and the Middle East. Papers involve international collaborations evidenced by joint contributions and come from scholars in universities, academic institutions, and practices in Belgium; Egypt; Greece; Italy; Jordan; Malaysia; Palestine; Qatar; Saudi Arabia; Serbia; Spain; Turkey; and the United Kingdom. In this editorial I briefly outline the key issues presented in these papers, which include topics relevant to social housing, multigenerational dwelling, practice-based research, sustainable design and biomimetic models, learning environments and learning styles, realism and the post modern condition, development and planning, urban identity, contemporary landscapes, and cultural values and traditions.

ADVANCING THE DISCOURSE

The multifaceted nature of architecture, planning, and built environment research is clearly manifested in this issue of IJAR. The issue involves a wide spectrum of views related to housing research. Five papers juxtapose these views in various contexts. Agatangelo Soler
Montellano addresses the notion of indeterminacy as one of the rising trends in flexible housing design. Based on a series of users interviews, photographs, diagrams and new drawings that show how people spatially and socially use their apartments Montellano assesses the validity of indeterminacy as an architectural response to social change in the context of Spain (Montellano, 2015). Relating to social and demographic transformations and spatial challenges Sebastiaan Gerards, Roel De Ridder, Sylvain De Bleeckere present their findings of exploring multi-generational dwelling in the context of Flemish communities in Belgium. Utilizing a ‘research by design’ approach to explore and at the same time encounter design issues the authors experiment with this new housing concept in a specific, but realistic setting through a workshop format. The exploration results in establishing key considerations for further research, toward an effective implementation of multi-generational dwelling in Flanders (Gerards, De Ridder, De Bleeckere, 2015).

The work of Mohd Firrdhaus Mohd Sahabuddin and Cristina Gonzalez-Longo takes a different route and places emphasis on thermal comfort in the context of Malaysian social housing. Their work introduces a new typology that aims at enhancing thermal comfort and argues that traditional values should be integrated into social housing design to achieve a certain measurement of natural ventilation in a typical Malaysian residential unit or a house (Sahabuddin and Gonzalez-Longo, 2015).

Raffaello Furlan argues for the need to reestablish the relationship between cultural traditions and house form. Furlan addresses the nature of vernacular architecture in a precise context by placing emphasis on the architectural form of vernacular houses built in Brisbane, Australia in the post WWII period by first generation Italian migrants. His exploration involves various aspects including the spatial organization, materials and construction techniques, decorative elements on the façades, and ways in which these were materialized through migrants’ cultural traditions (Furlan, 2015). The study of Seyed Reza Hosseini Raviz, Ali Nik Eteghad, Ezequiel Uson Guardiola, and Antonio Armesto Aira aims to establish guidelines for future flexible housing design. It involves two case studies relevant to Dutch housing with a focus on the spatial organization and its potential in achieving efficient spatial configuration (Raviz, Eteghad, Guardiola, and Aira, 2015).

In dealing with the relationship between people and their surroundings and the creation of sustainable environments Marta Brković, Oriol Pons, and Rosie Parnell offer a participatory post-occupancy approach within which their study was undertaken in the context of Barcelona, Spain. In essence, their work juxtaposes schools and schooling and argues that new models for exploring the pedagogical potential of sustainable schools should be developed and the efforts of all relevant parties should be synchronized; from architects to governments, from students to teachers.

The work of Sharifah Mazlina Syed Khuzzan, Jack Steven Goulding, and Farzad Pour Rahimian hypothesizes that learners can learn better with a bespoke personalized learning environment, in which the deployment of teaching and learning material is directly augmented towards their individual needs. They present findings from the development of a holistic conceptual Diagnostic Learning Styles Questionnaire (DLSQ) Framework, which is comprised of six interrelated dependencies (i.e. Business Strategy, Pedagogy, Process, Resources, Systems Development, and Evaluation). The convergence of these dependencies directly influences pedagogical effectiveness. Validating their argument they maintain that such a framework can enable better augmentation of organizations and educational institutions of their strategic priorities and learner-specific qualities (Khuzzan, Goulding, and Pour Rahimian, 2015).

In the context of rapidly growing Middle Eastern cities, Ashraf Salama and Anna Grichting offer an overview of landscape interventions in three Middle Eastern cities (Cairo, Doha, Riyadh) and identify three levels of contribution of contemporary landscapes that correspond to three landscape typologies: the edge, the center, and the backbone. They examine a number of issues
underlying each landscape typology and offer an interpretation on the contribution of each typology to its context and to the city within which it exists (Salama and Grichting, 2015). On the other hand, placing their work within the notion of ‘architecture and realism’ Renatro Capozzi, Adelina Picone, and Federica Visconti offer a philosophical interpretation that contrasts realism with the post modern condition in the context of a city and present a series of key projects and pedagoical design exercises that manifest such a juxtaposition (Capozzi, Picone, & Visconti, 2015).

Expanding the scope of her earlier writings on traditionalism, authentication and fabrication of the built environment of Muslims, which was published earlier in IJAR (Al-Lahham, 2014) Abeer Al-Lahham critically examines the concept of the neighborhood in light of the ‘New Urbanism’ discourse and the capacity of these to achieve their promises in creating coherent structure for contemporary societies. Her examination reveals that these were merely housing schemes and manifest failures in achieving what they claimed to (Al-Lahham, 2015). In London; a totally different context, Saul M. Golden, Ian Montgomery and Taina M. Rikala develop an argument that call for architects to act more explicitly to promote greater openness and use-value, rather than more objectified and controlled exchange-value approaches to the public domain in private-led development interventions. By comparing a number of parameters in two cases the individual practitioner’s experiences of architecture practice with explicit intentions to influence better quality shared city space, and examining professional norms relevant to commercial clients and wider society, they conclude that employing a wide range of strategies can contribute to better engagement of people in contemporary urban societies (Golden, Montgomery, Rikala, 2015).

Two papers are developed in the context of the Mediterranean. Pantoleon Skayannis, Angelos Kyratzakos offer a chronological development of planning in Thessaloniki, Greece since the mid-eighties. Specifically, they discuss the Lachanokipoi area of the ‘Western Entrance’ of the city and highlight three periods of development with a focus on economic drivers and trajectories. Their work concludes with a call for urban renewal of the area as an integral part of the general spatial plans adopted by city authorities (Skayannis and Kyratzakos, 2015). Another research intervention in the Mediterranean region is articulated in the work of Derya Oktay, Havva Alkan Bala. By utilizing an attitude survey they offer a holistic research approach to measuring urban identity in the context of Kyrenia, Northern Cyprus. Their findings indicate that although historic landmarks are so powerful in constructing the urban identity, traditional urban pattern and social life have not been found significant in constructing the images of the city unless local residents frequent them. Among other findings their survey reveals that the new housing developments that lack locally appropriate architectural and contextual qualities do not necessarily influence the urban image of the area (Oktay and Bala, 2015).

Shehada, Ahmad, Yaacob and Keumala also emphasize issues related to conservation of heritage buildings in a paper. They argue that Sustainable building conservation can be accelerated by an appropriate reuse selection and evaluation criteria and procedures. They develop an inclusive methodology in order to optimize adaptive reuse selection of heritage buildings. Utilizing a Delphi Method (DM) with fuzzy logic theory, they apply their methodology on Khan Al-Wakalah as a case from Palestine. Findings demonstrate that there is a clear evidence of a link between the criteria and the key substantial factors and that such a link is of great importance and should be further considered in the evaluation and selection processes (Shehada, Ahmad, Yaacob and Keumala, 2015).

Shatha Malhis, Fatima Al-Nammari utilize the space syntax methodology in addition to interviews and ethnographic analyses to examine the three-floor gallery plans of the Abu-Jaber Museum that correspond to the two stages in the evolution of the Abu-Jaber House: 1880, when it was originally constructed to house the families of three affluent brothers; and 2007, when it was rehabilitated into a local heritage museum. In essence their work establishes the three-way
interaction between spatial structures and architectural language, interpretations of conservation priorities and curatorial principles (Malhis and Al-Nammari, 2015). Nelly S. Ramzy on the other hand builds her work on Biomimicry as a growing area of interest in architecture. She demonstrates that adopting biophilia and biophilic design principles leads to enhanced outcomes in terms of sustainability as well as human psychology and users well being (Ramzy, 2015).

The sixteen contributions presented in this edition of IJAR offer a wide variety of ideas, concepts, arguments, and research findings presented by authorities, distinguished academics, and committed scholars. Reiterating, they offer a great venue for achieving excellence in research in architecture and urbanism while paving clear pathways for debating the complexity of built environment. In this respect, I seize this editorial to thank my two co-editors for their excellent efforts both at the technical and editorial levels, and extend my gratitude to all members of the International Advisory and Review Boards for their support, review efforts, insights, and overall guidance. I invite academics to contribute high quality research and critical arguments that aim at enhancing architectural discourse and debating the contemporary urban condition and to submit quality work for consideration in future issues of IJAR.

REFERENCES


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HOUSING FLEXIBILITY BY SPATIAL INDETERMINACY: THE CASE OF THE CASA DE LAS FLORES IN MADRID

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Abstract

The indeterminacy of the domestic space is one of the main trends in flexible housing design. It involves the possibility of using the rooms in a dwelling in multiple ways that are not determined by the architect. The views of non-functionalist housing are more present lately, but still forbidden in the Spanish social housing market, where regulations stipulate a strict functionalist housing plan. However, there is a premodernist example of this strategy in Madrid: the Casa de las Flores (the House of Flowers), a rationalist building from 1931 with a neutral plan of indeterminate rooms. This study comprises a series of interviews with the users, photographs, diagrams and new drawings that show how people use their apartments. The aim of this research is to assess the validity of indeterminacy as an architectural response to social changes in Spain, with a view to its introduction in future housing developments.

Keywords: architecture; flexibility; indeterminacy; social housing; Spain

INTRODUCTION

The design of social housing in Spain depends on a dense set of rules that strictly defines the form and use of the domestic space. These design norms were originated in the mid-20th century (Ministerio de Vivienda, 1969), according to an institutionalised idea of nuclear family and family home that does not match the current social trends in the country. The changes in the composition of the population, the evolution of society and the cultural transformations (Leal, 1995) that have taken place since the beginning of democracy in 1978 alter the character of the domestic space (Putnam, 2006), and contemporary homes in Spain must host different lifestyles and freer family organisations.

A possible strategy to face this lack of correspondence between the social housing features and the growing variety of user needs is flexibility. According to Schneider and Till definition, “flexible housing is housing that can adjust to changing needs and patterns, both social and technological” (2007). In words of these authors, these changing needs can be personal, practical or technological, and the changing patterns may be demographic, economic or environmental. The broadness of this definition includes some different architectural and managing strategies for an increasing diversity of users, lifestyles and rhythms of activity.

Adrian Forty (2000) describes two main trends in the design of flexible housing. On the one hand, there is the machinist view of a flexible home as a transformable space, dominated by mobile walls and furniture or mechanic devices designed to host the different activities of the family in daily or season cycles. In this kind of architecture, the users should follow a number of predetermined steps to take advantage of the flexible possibilities foreseen by the architect. Some famous examples of this idea are the Schroeder House in Utrecht, by Gerrit Rietveld, and more recently the Flexible Apartments in Carabanchel, by Aranguren y Gallegos (Soler Montellano, 2012).
On the other hand, there is the view of the home as a space open to indeterminacy, where the architect does not predetermine the function of every room and transfers the power of defining the use of the domestic spaces to the users. Some examples of this strategy are the apartments in the Weissenhofsiedlung by Mies van der Rohe, or the Reicke House in Bottmingen by Michael Alder.

Some architects such as Rem Koolhaas (Koolhaas & Mau, 1995), Herman Hertzberger (1991), Michael Alder and Roger Diener (Alder et al., 1993), and Till & Schneider (2005), lean towards this second strategy. However, flexibility in Spanish social housing cannot be reached by means of indeterminacy due to the thick normative set that precisely defines the size and the function of the rooms, and also the spatial relationship between them. To support the idea that indeterminacy, as a flexible strategy, could be an appropriate instrument to overcome some of the domestic problems derived from the phase lag between regulations and social reality exposed above, it is necessary to conduct an in-depth study of its actual validity; its advantages, disadvantages, potential and ability to accommodate users’ needs. The case-study to be presented here is intended as a contribution to this more general goal.

Despite the lack of contemporary examples in Spain, a premodernist model of spatial indeterminacy in Madrid can be found: the Casa de las Flores (the House of Flowers, Figure 1). This housing building from 1931 is a good example of what Léger (2006) has called the Plan Bâlois (the Basel Plan) —a low-depth building with two strips of independent similar rooms separated by a central corridor. This plan derives directly from a very common housing type in German and French multi-storey apartment buildings in the second half of the 19th century and the beginning of the 20th (Moley, 1999). Theoretically, the flexibility of this neutral layout, this Basel Plan, comes from the indeterminate function of the rooms, their balanced geometry and the possibility of combining some of them to create larger spaces.

The aim of this work is to analyse the ways in which the apartments in the Casa de las Flores are used, with a view to exporting these design strategies, when successful, to future housing developments. This study is the second one of a larger research project, the purpose of which is to analyse lifestyles in some of the few flexible housing projects in Spain, and furthermore to assess the validity of flexibility as an architectural response to social changes in this country.

Figure 1. (Left) View of the Casa de las Flores block from south-west; (Right) view from north-west (Source: José Hevia, 2009)
A SPANISH CASE OF SPATIAL INDETERMINACY: LA CASA DE LAS FLORES

The *Casa de las Flores* is a multi-storey housing block built in 1931 by the Spanish architect Secundino Zuazo (Duarte et al., 2007). He had established strong professional bonds with German architects and was acquainted with European rationalist architecture, which he later reproduced in Spain (Sambricio, 2013). Along with the rationalist features of the building volumes and urban plan, the apartments in the *Casa de las Flores* are a very good example of spatial indeterminacy (Fig. 2). The rooms are arranged in series with a similar size and independent access through a central corridor, so they can be used, combined or divided in many different ways. Also, the entrance hall is large enough to host different uses, as a different room or an office in connection with the exterior. In total, the apartments have four (88 m$^2$ of net usable area) or five rooms (103 m$^2$).

Figure 2. Typical floor plans of the *Casa de las Flores* (Source: Milla et al., 2003)

Figure 3. View of the central garden (Source: José Hevia, 2009)
Apart from the housing typology, the Casa de las Flores stands out in Madrid because of its urban approach. It is a pair of longitudinal buildings, placed parallel to one another from north to south with a large central garden between them. Each of these blocks is in turn made up of two dwelling strips, separated by large inner wells for illumination and ventilation. Because of its architectural and urban features, very innovative in the Madrid of the time, the building became a symbol of modernity. Thanks to the community life generated around the garden and its lush vegetation (Fig. 3), the building earned the name by which it is known. The Casa de las Flores is valued and protected since 1981 as architectural heritage (Milla et al., 2003), and is listed by the Iberian Docomomo Foundation.

**METHODOLOGY**

The building is divided into ten blocks. The six central blocks contain the neutral plan apartments of our interest. This research focuses on one these blocks, one of the few that have not been bought by a big real estate agency. These companies have refurbished all the housing units in the same way and they do not let tenants modify them, so their architectural evolution does not concern our study. Instead, in the block we chose to work on, the apartments belong to their users, so they could have undergone changes in their form and use. These changes are the core of our research. The work includes the analysis of 18 of the 28 apartments in this block. Among the owners of the 10 apartments not included in the study, 4 refused to collaborate in the study and 6 were not found at home during the week or even the weekend. The evaluation follows the survey methodology established by Preiser and Vischer (2005). It was carried out in three phases:

- **Phase I:** a series of personal interviews with the users of approximately thirty minutes long. They included up to 54 questions relating to the comparison between the indeterminate layout and conventional housing; to life in common; to the building's image and shared areas; to the assessment of the years spent in this apartment; and to the family and professional situation of the users. The interviews were made with a notebook, voice recorder and a photo camera. Walkthrough inspections were conducted in each housing unit. This approach has already been established by other architecture performance evaluations (Preiser et al., 2009; Peschardt & Stigsdotter, 2014; Tezgelen & Karaman, 2014).
- **Phase II:** a series of drawing plans were made showing the current, former and future (expected) layout, furnishing, refurbishments and use of every apartment. These drawings show the evolution of the rooms' form and use along users' life, defining a schematic history of every home.
- **Phase III:** a comparative analysis of the data collected in phases I and II, aiming to detect some common trends in the use and the configuration of the domestic space. It has offered significant information concerning real-life experience inside these homes and the relevance of indeterminacy in contemporary housing architecture.

This study focuses on a qualitative analysis of the extracted data, rather than on a statistical analysis. In this sense, the study of every single apartment and its inhabitants gave us original and relevant new knowledge about the performance of indeterminate space. This kind of approach is supported by the French school of post-occupancy evaluation. The corpus of the French POE focuses on the sphere of innovation and evaluation of residential architecture, and is based on the *observations expérimentales* of Chombart de Lauwe (1960); on the *étude socio-architecturale* of Philippe Boudon in Le Corbusier’s garden city of Pessac (1979); and the later work of Monique Eleb (1997) and Jean-Michel Léger (one of his latest evaluations: Guth, Léger, Trivière, 2013).
THE INHABITANTS OF THE CASA DE LAS FLORES

The Casa de las Flores was built with public funding and had initially a social character. Nevertheless, after the reconstruction of the building following the Spanish Civil War (1936-1939), the apartments were rented to members of the military, professors and public servants of the new regime, according to the account of one of the owners, who was born in his current dwelling in 1947. This change of class and the rapid increase of property value —though it was built on the outskirts of the city, in a few years the complex was integrated in one of the most expensive residential and commercial districts of the capital— have kept this housing building away from its original goal. Current users belong to a well-off middle class, with a high education level and good job positions. Specifically, among the 38 adult users included in the study, 15 have a university degree and 13 are university students, while only 2 are secondary school graduates and 2 have only a primary school degree. The six remaining adults did not answer this question, as a matter of privacy. In connection with their positions —apart from the students—, 17 of the adults have a qualified job (architects, lawyers, doctors, psychologists, economists, military officers, etc.), 2 have or have had a non-qualified job and 3 women stay at home. The 18 apartments under study are named with letters from A to R. Among them, 2 have been transformed into co-working offices, though their owners originally considered also living there, and 1 apartment is used as a medical centre.

According to the dates when the interviewees started living in their apartments, three different groups can be established. The first one comprises four families who have been living in the building for a long time. Three of them, families D, L and P, moved in between 1939 and 1944, when the building was reconstructed after the Civil War. Family J arrived later, in 1979. These families lived the golden years of the Casa de las Flores. They experienced the sense of community forged around the big garden —where they and their children played—, and saw it fade over the years. A second group of six families (A, B, C, E, F, G) established there between 1991 and 1995. They were unable to enjoy the garden and other common spaces, as their use had been forbidden some years before due to disagreements among residents. Finally, there are eight apartments (H, I, K, M, N, O, Q, R) occupied since 2000, after the auction in which the government privatised the building and the property of all the apartments. Figure 4 shows the current plans of the eighteen dwellings.

THE FLEXIBILITY OF THE INDETERMINATE SPACE

The variability offered by the Basel plan is the reason why there are 12 different models of domestic organisation in the 18 apartments (fig. 5). In total, we count 21 different apartment configurations, including those used in the past and those planned by tenants for the future. The most repeated layout consists of a non-exploited hall, a large living-dining room and bedrooms. Currently it can be found in four apartments, while the historic analysis shows that it has been used in the same way in eight apartments.

The use of the domestic spaces in the Casa de las Flores has changed over time, with the transformation of family structures, domestic trends in Spanish society and the professional needs of the inhabitants. The similarity between the orientation, the area and the position of the doors has favoured permutation in the rooms' use. Though we can suppose that the number of changes in the dwellings essentially depends on time, the facts show that time is not a decisive factor in this sense. While apartments P (fig. 6) and L have experienced seven permutations since 1941, apartments D and J have only undergone one since 1944 and 1979, respectively. Some dwellings occupied much more recently have experienced more changes in the use of the rooms, as apartments P —six changes since 2012— and F —five permutations since 1995. The high degree of polyvalence of these spaces is shown by the fact that every space in the dwelling, from the hall to the last room, has been used as a living room in one of the housing units.
Figure 4a: Current plans of the apartments (Source: Author)
Figure 4b: Current plans of the apartments (Source: Author)
Figure 5a: Current use of the apartments’ rooms (Source: Author)
Figure 5b: Current use of the apartments’ rooms (Source: Author)
In total, 42 changes in the rooms’ use were registered in the 18 apartments studied. Upon summarizing in a single drawing all the uses that each room has served over time (fig. 7), it becomes apparent that the living room is often placed close to the hall and the rooms at the end are used as bedrooms. But in apartments D, L and P, occupied two generations before, the living-room was placed in the last room of the façade strip, which is slightly larger than the others and the most distant from the entrance door. The change in the situation of the living room within these dwellings matches the evolution described by Paricio & Sust (1997): in the second half of 20th century, domestic space tends to functionalisation; families tend to organise the rooms hierarchically, to extend the living room and to place it closer to the apartment entrance door. Therefore, the functions of two ends of the dwellings are strongly conditioned by social customs: the living room in the first place and the bedrooms in the last one. The flexibility of the Casa de las Flores is particularly noticeable in the middle section, in the intermediate rooms which gather a wider variety of uses: living rooms, bedrooms, studies, housework spaces, etc.

On a different note, the drawings also show how easily the housing units of the Casa de las Flores adapt to cohabitation and usage models outside those of the nuclear family. Specially, the dwellings are easily convertible into shared apartments. The study of this kind of home (apartments C, H, I and R) reveals that the Basel plan allows a very balanced distribution of the space and a great autonomy for each user. Besides, a high rate of professional activity is found in the building, but this is due to its urban situation and the fact that most of the users have liberal professions that they can carry out at home, rather than the architectural features of the housing units.
REFURBISHING THE DWELLINGS

The refurbishments carried out in the apartments offer an idea of what parts need to be updated, either to host new family structures or to adapt to new trends. Among the 18 apartments subjected to the analysis, only apartment D has never been renovated and keeps the original architectural features. We find two refurbishment types: those that modify technical, furniture or comfort aspects of the dwelling, without altering the space configuration; and those that modify the typological characteristics of the apartment. The former—which do not affect this research—are mainly used in this building to modernise the kitchen and bathrooms; and among the latter, the most usual refurbishment is the opening of a double door or an arch in the wall between the two first rooms, to create a dining-living room. Then, the most common refurbishments are the complete removal of walls between rooms, the construction of built-in closets in the bedrooms, the reduction of the last room to extend or to create a new bathroom, and the kitchen extension. The majority of these works aim to functionalise the home: from a neutral plan characterised by the indeterminacy of the rooms to a conventional plan where the rooms have a hierarchical structure. There the common space is perfectly defined by its large size and the bedrooms by their smaller size and built-in closets. Besides, the kitchen extension is linked to a cultural change (Putnam, 2006), related to the unformalisation of domestic habits, the disappearance of the domestic service and the view of the kitchen as a clean, nice, living space.

ABOUT THE BIG ENTRANCE HALL

One of the special features that set these dwellings apart from the conventional type found in current Spanish housing is the big entrance hall (fig. 8). Its area, 11 m², is larger than the 10 m² double bedrooms established by the local social housing design regulations (Empresa Municipal de la Vivienda y Suelo de Madrid, 2008). This area represents a significant percentage of the net usable area of these medium-sized apartments: 12.5% in the four-room apartments and 10% in the five-room apartments. Due to their size and position within the home, we expected these halls to be used in a broad range of ways: dining, living, game room, atelier or even as a bedroom for occasional guests. This kind of supplementary spaces of indeterminate use is, for example, highly appreciated in France (Léger, 2010) and Switzerland, where the regulations stimulate its existence (Martín Blas & Rodríguez Martín, 2012).

Reality, however, surprised us: aside from the three housing units converted into offices, where the halls function as reception and secretary's office, in most of the apartments the halls have no particular role, and users seldom develop any family, professional or leisure activity in them. Not even in the apartments where only one person lives, and where their activity would not be disturbed by other users passing by.

Only two owners, C and F, use their halls regularly. They are, respectively, a psychologist and a professional translator who have furnished them with an office desk and a desktop computer. However, most of the time they do not work there, often choosing to work with their laptops on the table in the dining room, which is a nicer, wider, more autonomous and better illuminated place. Moreover, even while not serving a specific activity, the hall is furnished as a small parlour in apartments D and P, inhabited since the 1940s. This arrangement has been maintained in these two cases ever since they were first occupied, seventy years ago, when it was common to distinguish the living room, for daily family use, from the parlour, more formal, used to welcome guests and seen as a measure of the family’s status (Diéguez Patao, 2006). Currently, user P never uses this space and user D does it once or twice a year, "when her nephews visit her".
ABOUT THE POSSIBILITY OF COMBINING THE ROOMS

A fundamental reason to explain the under-use of the hall is its lack of connection with the adjacent spaces: the kitchen and the first room. In the first case, the kitchen door is placed in the middle of the corridor, on the other side of the entrance hall. The distance between them hinders the use of the hall as a dining room. In the case of the first room, usually used as a living room, it is connected to the hall through a single door opened in the building's load bearing wall. The difficulty of extending this narrow opening visually detaches two spaces that could share the function of being the house's common space. An inhabitant of apartment H put it in this way: “With such a large hall in these apartments, a double door opened there would give it much more spaciousness; it would be great for parties”. The presence of this load-bearing wall not only reduces the connection between the hall and the first room, but it also brings about the same result in the whole apartment, dividing it into two parallel strips, impermeable to each other. No transversal relation has been established in any of the apartments studied, given the difficulty of piercing the wall and the non-coincidence of the doors along both sides of the central corridor. There is however a great degree of flexibility in the strip of rooms in rows along the façade. The owners have exploited this possibility, so in the building there are several room combinations (fig. 9), from dwellings where all the rooms are separated, to another one where all the rooms along the façade are joined. The most repeated layout—I we find it in seven apartments— is that of two rooms joined together by a double door. In apartments B, F, H and R, these alterations have occurred more than once, with the aim of separating again rooms that had been combined at some point.
ABOUT THE SMALL LIVING ROOM

The frequent combination of two of the rooms along the façade to create a living-dining room makes one of the main features of the neutral plan appear as a problem: the inexistence of a large space within the repetition of similar 14 m² rooms. According to the inhabitants, the combination of rooms gives a pleasant feeling of spaciousness, and increases the spatial richness of the apartments. Therefore, most of the owners —13 out of 18— have decided to combine at least two of their rooms. Figure 9 shows some different existing living rooms. Excluding two of the three offices, where every room is separated, only three of the fifteen current homes keep their rooms separated. They are the shared flats R and H, both inhabited by four students who carry out most of their daily activities independently, in their bedrooms; and apartment D, where the living function has been divided into two single spaces: a daily living and a reception parlour, as we said before.

To support the idea that the nature of the living room is more influenced by cultural trends than by family size, it suffices to see how the two large families who arrived the latest to the building (family F in 1991 and family G in 1995, both with five members) keep a double living room even though in the two cases, two adult sons have had to share a single room.

CONCLUSIONS

The great number of variations registered in the apartments show the flexibility of this plan of indeterminate rooms. Generations have used these dwellings along the years, thanks to the possibility of changing and permuting the use of the rooms, joining or separating them at their convenience. Specifically, in 14 of the 18 apartments studied they have taken advantage of the
rooms’ versatility to alter their use, and in 15 of the 18 they have joined and/or separated them. The reasons of these changes are varied: The changes in family composition; the adaptation to different trends in the configuration of the domestic space; the introduction of professional activities within the dwellings; and the adaptation to different cohabitation models outside the nuclear family.

The spatial indeterminacy of the Basel plan has facilitated these changes, and it is specially useful in the case of shared apartments and rooms dedicated to professional use. Its ability to adapt to diverse domestic situations and lifestyles shows that the Casa de las Flores housing type is a useful model to face the housing problem exposed at the start of this paper. However, this housing type also presents certain issues, which architects and developers have to be aware of. To recommend its normative acceptance and its implementation in future public housing developments, the following remarks should be taken into account:

- A neutral plan of indeterminate rooms must be flexible enough to allow users to organise the domestic space hierarchically, in a conventional way. In its essential form, the Basel plan clashes with the preferences of the majority of users, who have extended the size of the living room and have thus established a functional house with determinate rooms: a living-dining room, a main bedroom and a smaller bedroom at the end of the apartment. The success of the Casa de las Flores is that it allows this kind of modification in a simple and inexpensive way, just opening or eliminating one of the partition walls. The owners praise this characteristic of the original dwelling; most of them even accept, in exchange for flexibility, the lack of other elements that usually determine the function of the domestic spaces, as for example built-in closets, ensuite bathrooms and a clear distinction between a public/daytime area and a private/nighttime area.

- The main disadvantage of these housing units is the lack of a transversal relation between the two parallel strips that define the apartments. This hindrance is due to the existence of the load-bearing wall that crosses the apartment longitudinally, dividing it into two poorly connected parallel areas. Currently, the choice of the usual structure of beams and columns would allow establishing multiple transversal connections and combinations. The possibility of associating the spaces would not be limited to the contiguous rooms along the façade, and so the variety of possible layouts of the dwellings would increase significantly.

- Regarding the unexpected under-use of the big entrance hall, it should be noted firstly that its architectural features hinder a stable use and, secondly, that it is a border room hard to merge into the home dynamics. It does not seem then justified to include large entrance halls in new multi-storey social housing projects, where the resources and the housing areas are particularly limited.

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DESIGNING MULTIGENERATIONAL DWELLING: A WORKSHOP WITH FOUR FLEMISH ARCHITECTURE FIRMS

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Abstract
Due to social shifts, demographic changes and spatial challenges, housing is at the top of the social agenda in Flanders. Recently, communal housing concepts are being put forward to strive against these general developments. This paper presents research on multigenerational dwelling, as one possible renewed communal housing concept for Flanders. The authors develop a working definition for multigenerational dwelling, which lays the foundation for the main part of the paper: the translation of a theoretical framework into architectural design. Methodologically the authors use the method of research by design to experiment with this new housing concept in a specific, but realistic setting. More specifically, they organized a workshop with four Flemish architecture firms to investigate different modes of sharing space within a multigenerational dwelling. Furthermore they formulate key considerations for further research and the implementation of this renewed way of dwelling in Flanders.

Keywords: multigenerational dwelling; design; modes of sharing; Flanders

INTRODUCTION
This paper builds upon research by design as a method to question the renewal of the Flemish housing stock, which is largely made up of single family, detached dwellings in a suburban residential environment. As in other European countries (Rodriguez & Siret, 2009), this housing model is under pressure, because it faces demographical economical and spatial challenges. In the context of the ongoing debate, communal housing concepts are put forward as one possible solution. (Declerck et al., 2012; Swinnen, 2013; Van Herck & De Meulder, 2009). Yet we argue that recent research on collective housing in Flanders (Lyppens, 2012), and most realized projects (Van Herck & De Meulder, 2009) tend to focus on a more communal approach on the level of the neighborhood. The essence of housing, let alone communal housing, is not really being addressed. Furthermore, within the quest for new housing concepts, the history of communal housing in Flanders is totally neglected. Multigenerational dwelling, as we know it from historical family farm housing, remains undetected.

This paper presents a central part of the authors’ research on multigenerational dwelling. After theoretical inquiry throughout the last years, this paper deals with research by design, to ‘test’ multigenerational dwelling as a new housing concept for Flanders. It is a pathway in which design is used to clarify the potentials and conditions for this ‘new’ way of dwelling.

To elucidate the need for designerly research into the issue of multigenerational dwelling we will present some background information on the case of Flanders. Our choice to focus on this part of federal Belgium is legitimized by the fact that both environmental planning and housing policy are Flemish (regional) competences. We will argue, that demographic trends, confronted with the Flemish Housing Policy implicate the need to rethink traditional housing in Flanders. As one possible answer to the current housing need and need for housing we introduce a renewed definition of multigenerational dwelling. This working definition lays the foundation for the main part of the paper: the translation of our theoretical framework into architectural design.
TOWARDS NEW HOUSING CONCEPTS FOR FLANDERS

Rethinking space and the introduction of new housing concepts in response to new lifestyles and demographic trends is becoming extremely important. In the following part we investigate how current demographic trends rub against the Flemish Housing Policy, and question if a communal housing concepts like multigenerational dwelling might be an option to bridge the gap between the current need for housing on the one hand, and special Flemish housing needs on the other hand.

Demographic trends and their implications

Due to social shifts, such as population aging, family dilution and international migration patterns, the Belgian region of Flanders is confronted with a new housing need. By 2030 the number of Flemish households will raise by 300,000 units (Ryckewaert et al., 2011). Almost one-third of them will be single-households (Lodewijckx, 2008), and face increasing affordability problems (Canfyn, 2012). But undeniably, the universal right to housing (United Nations, 1948) cannot only be realized through the provision of a certain amount of dwellings. Also qualitative housing needs are changing. Kesbeke et al. (2012) argue that the changing family composition is the driving force behind this development. E.g., as the average life expectancy increases, there will be more and more seniors left behind in dwellings on the countryside, which are far too big because they were initially built for larger families with children (Myncke & Vandekerckhove, 2007). In Flanders the group of people older than 60 years will grow from 1,1 million in 2008, to 1,58 million in 2030 (Ryckewaert et al. 2011). Moreover, the population of people older than 80 will increase from 289,00 to 472,00 in the same period of time. Apparently, we are dealing with a rapidly growing group of elderly people, with changing requirements concerning their homes and residential environments (Ryckewaert et al. 2011). Moreover, the average number of children in an average household declined, while there is an increasing number of divorced people, singles and childless couples (Lodewijckx, 2008). The traditional nuclear family (two adults and kids) has lost its importance and representative character in present days. Without doubt, one of the major parameters of Flanders in transformation is the singleness and loneliness of its inhabitants (Heylen, 2010). In this paper we question how to cope with this general evolution, knowing that traditionally most Flemish people prefer to live in detached, suburban, privately owned dwellings.

Flemish housing policy

Already in 1960 half of the Belgian households owned their house. Zooming in on Flanders, in 2005 74.4% of all households owned a home, 5.6% lived in social rental housing, 18.5% lived on the private rental market and 1.5% lived for free (Winter & De Decker, 2009). The spatial consequence of this way of housing in Flanders can best be described as ‘sprawl’ or ‘wild housing’ (De Decker, 2011). Following De Decker (2008) we need to elaborate three structuring tracks in order to understand the development of the Belgian ‘sprawl/home ownership’ model. These may be seen as three sustainable policy lines. First, urbanization was avoided in the political fear of social unrest and rebellion in cities. Second, home ownership was stimulated to counter the twin-development of industrialization-urbanization. Not only liberal policies sustained the model; the initiatives of the Catholic Church also reinforced its foundation (De Decker, 2008). And third, De Decker argues, ‘the very absence of a spatial planning policy facilitates sprawl’ (2008: 157). Until 1962 Belgium had no spatial planning policy. De facto this meant that the post-war private house construction boom occurred almost without any spatial planning.

The combination of these three policy lines led to a continuous evenly spread urban sprawl covering the whole of the Flemish territory. Hoping to counter this trend, the 1997 ‘Ruimtelijk Structuurplan Vlaanderen’ (first comprehensive spatial plan for Flanders) formulated its preference for ‘high quality infill development’ or ‘de-concentratred clustering’ (Declerck et al.,
However, more than ten years on, it has become abundantly clear that the hoped-for break with current trends has not sufficiently happened. Current mechanisms reached their limits and policy makers need to develop future oriented solutions. According to Declerck et al. (2012), scarcity of land, energy efficiency, mobility and especially the need for affordable housing justify this position.

Cohabitation: multigenerational dwelling

Following van de Weijer & Bervoets (2012) the existing housing market in Flanders is quite inert. By consequence changing housing needs need to be captured within the existing housing stock. In practice this is leading to sticking situations. Indeed, today our historically developed residential landscape occurs as a sum of individualistic housing needs (De Decker, 2008). Housing concepts used here are outdated and do no longer suit our changing Flemish society (Declerck et al. 2012). In this regard, housing is at the top of the social agenda in Flanders, and communal housing concepts are introduced as one opportunity to strive against these general developments (Swinnen, 2013; Van Herck & De Meulder, 2009).

Based on three focus sessions with stakeholders involved in the issue of (communal) housing in Flanders (e.g. policymakers, architects, inhabitants) De Ridder (2013) calls for more experimental research. Partially this is done under supervision of Flemish Government Architect Swinnen. In 2013 he started to work on new models of collective housing, which will result in four pilot projects.

Either way, this work by Swinnen, other research on collective housing in Flanders (Lyppens, 2012), and most realized projects (Van Herck & De Meulder, 2009) tend to focus on a more communal approach on the level of the neighborhood. Communal housing under one roof is not really addressed. Furthermore, within the search for new housing concepts, the effective history (Wirkungsgeschichte) of communal housing in Flanders is totally neglected (De Bleeckere & Gerards, 2013). Multigenerational dwelling, as we know it from historical family farm housing remains unnoticed. Yet we learn from international experience that multigenerational housing is ‘staging a comeback’ (Taylor et al., 2010: 4). Whether with family ties between the inhabitants, or without any family ties, several social, spatial, ecological and economic advantages can be booked through living in a multigenerational dwelling. Perhaps the most valuable advantage of multigenerational housing is the fact that it addresses care (especially for elderly) as an increasing social and economic issue.

On the basis of literature research (mainly McCamant & Durrett, 1994), and the focus sessions by De Ridder, we developed a theoretical framework and a working definition for a renewed way of multigenerational dwelling in Flanders. This definition contains seven essential elements: (1) Multigenerational dwelling arises during a convivial process, (2) including at least three different adult generations, and (3) in creative dialogue with a designer. (4) All inhabitants choose for cohabitation in one house. (5) To make the multigenerational dwelling inhabitable for all generations, Universal Design is integrated at least on one level of the house. (6) The multigenerational dwelling is managed by the residents. (7) And finally, the inhabitants have no shared economy, which means that the community is not a source of income for its members.

DESIGN EXPERIMENTS

From an academic perspective we have to question if and how design can play a meaningful part in the development of new housing concepts. From our point of view, design can be put forward as a pragmatic methodology to test and analyze especially the spatial conditions for cohabitation in a multigenerational dwelling. Furthermore, it enables us to formulate important considerations for further research and the implementation of multigenerational dwelling in Flanders.
Design in an academic context
According to Cross (2006), science and design traditionally have a number of methodological contrasts. For example, science is analytic and design is constructive. Yet, Friedman (2008) states, that design can be used as a scientific research method that generates innovative and valuable knowledge. In this case the methodology is called research by design (Friedman, 2008). Following Cross (2006), it has become clear that designing is no normal problem solving. Designing involves a ‘co-evolution’ of ‘finding’ appropriate problems, as well as ‘solving’ them. In order to achieve change, design thinking has to take a critical stance towards the problem as presented. In this sense it has an added value for scientific research. Within the ongoing debate on ‘research by design’, ‘research in design’ and ‘research for design’, we acknowledge that design, especially in an academic environment, can address practical issues that are rooted in society, and generate design ideas to come to practical solutions in an effective way. Additionally, we recognize the fact that design can be used to generate a new interpretation of existing problems and reframe the issues at stake (van de Weijer, Van Cleempoel & Heynen, 2012).

Objects and things
One advantage of designing as a research methodology is the fact that its outcome is not only an object, but also a thing (Binder et al., 2011). Of course it can be seen as a device or artefact, ‘the embodiment of the object of design’, providing users with access to certain functions (in this case inhabiting), but the outcome is also a thing, ready for unexpected use, and opening up new ways of thinking and behaving.

From our point of view, the object of design can be used in an analytical way, to test theoretical research findings in a realistic environment. E.g. a theoretical description of multigenerational dwelling can be transformed into an architectural object. This object of design can be measured and analyzed. Whether a project is realized or not does not really matter. Design is able to densify information in comprehensible scenarios, models and pictures. It helps to visualize and analyze abstract ideas in a realistic environment. In this regard it functions as a feedback loop, which supports more theoretical research.

Just as valuable as the artificial outcome of a design process is its outcome as a thing. According to Binder et al. (2011), the etymology of the English word ‘thing’ reveals a journey from meaning an assembly, which was decided on beforehand to take place at a certain time and at a certain place to deal with certain ‘matters of concern’ to the community, to meaning nothing more than an object. Binder et al. plead to revisit and reverse the etymological history of things. Design things align human and nonhuman resources to move the object of design forward, to support the emergence, translation, and performance of this object (Binder et al., 2011). To use the words of Janssens (2012), designing things has a projective dimension, which helps to make sense of a certain situation. Accordingly, three characteristics of designing things appear on stage (Geldof & Janssens, 2007). First, design happens de facto with an outlook on the future. Second, design is focused on alternatives, which are prospective. They formulate possibilities that go beyond general accepted knowledge and expectations. And third, Geldof and Janssens argue, design stimulates imaginative abilities. Here, pragmatism penetrates both the design of objects and things. Imagination, central to pragmatic thinker Dewey’s work, expands our focus beyond a confused and dizzying present so that we can reflect and act in ways that may eventually bring about more desirable conditions (Fesmire, 2003).

WORKSHOP ‘MULTIGENERATIONAL DWELLING IN TERRACED HOUSING’
In what follows we will present a workshop we carried out in the summer of 2014. It represents a part of our designerly research into the architectural translation of the above given definition of multigenerational dwelling into a spatial design. Three questions, of which the first two focus on the object of design and the last one on its outcome as a thing, are at the heart of
our study. First we want to investigate if multigenerational dwelling is possible within a typical Flemish terraced house. Our choice to focus on terraced housing is legitimized by its representative character within the Flemish housing stock (especially within cities or towns) (ADSEI, 2013), and the fact that it has been put forward as more sustainable and space saving than detached housing (Brennert & Geister, 2004; Dubois, 1996). Second, we want to look at how designers organize private and communal use of the dwelling. Third, we want to find out which constituents drive the transformation of a traditional terraced house into a multigenerational dwelling. In our opinion it is necessary to construct a new vocabulary. In fact, what is sought, is a (new) conceptual basis for thinking about (communal) housing.

**The brief**

To answer these questions we developed a workshop with Flemish architecture firms Stramien, a2o, lava and BURO II & ARCHI+I. During a first meeting we gave some background information on current developments in Flanders and the need to develop new housing concepts. Additionally we presented our renewed definition of multigenerational dwelling, and gave them an existing terraced house in the city center of Hasselt, a Flemish city, and the capital of the Province Limburg (Figure 1). This building of approximately 200m², contains three habitable levels, cellar, attic and a garden. Each designer was questioned to analyze this building and its possibilities to be transformed into a multigenerational dwelling. The assignment was done individually during a period of one month, and without any interaction with the researchers involved.

To guarantee that the workshop would be finished within one month, we decided to work with five fictive inhabitants instead of real people. During the brief, the clients and future inhabitants (a young mother with a child, a middle-aged couple and an elderly man) were precisely described. Based on age, job and hobby’s, the designers got the chance to design a dwelling which suits to individual needs. Additionally, we requested to investigate if a realistic enlargement of these three households would be possible within the same building.

As a final result, and starting point for a final and joint focusses session, we asked each designer to present three pages (DIN A3), including at least the spatial organization of private and collective use of space within their design of a multigenerational dwelling.

**Outcomes of the individual design process**

Stramien’s design (Figure 2) is based on the concept of a street as a meeting point for all
inhabitants. This street crosses the terraced house and connects a night zone at the front side of the street with a day zone at the back of the building. To circulate from day- to night zone, each resident has to pass the communal street, which mainly consist of a communal kitchen.

![Figure 2. Section of the multigenerational dwelling by Stramien (Source: Authors)](image)

In their proposal BURO II & ARCHI+I clearly starts from a different angle. Privacy is of primary importance. Main floor and circulation zones are extended and used as communal areas. Similar to a traditional apartment, each level is home to one household, and can function independently.

Architecture firm Lava designed two different options. Within the first one, the dwelling is organized vertically. As a connector between all levels, the designers introduce a vertical ‘slice’, including all communal functions. To circulate from one private room to another, the inhabitants have to pass the communal zone. For example, the middle-aged couple has a private dining room on the ground level, a living room on the first level and a sleeping room on level 2. This means, that they have to use the communal space as a passage between their own private spaces. The second option is organized horizontally. Each household inhabits one level of the multigenerational dwelling. Circulation between these levels is realize outside the building. Garden, outdoor staircases and balconies serve as communal connector between all households.

a2o finds its inspiration for the design of a multigenerational dwelling in the historical concept to split up the circulation into a staircase for the master and another one for the servant. West European examples include some 19th century buildings by Horta in Brussels. This was done to enable the inhabitants to circulate to their private spaces, without necessarily having to meet one another. Each households inhabits one level of the multigenerational dwelling. Dining is done communally on the ground floor.

Processing and analysis

First of all, our workshop points out that the substance of the given terraced house has to be adapted to enable multigenerational dwelling. Nevertheless, no designer preferred new construction of the entire building. All designers enlarged the surface of the building by using the attic and adding extra space at the back of the building. Stramien even speaks about ‘heavy interventions’. Especially when it comes to the ground floor, all designers enlarged the surface. In
view of the fact that an elevator is too expensive for this kind of small-scale building, all architects designed accessible private zones for the elderly man of the ground floor. For the same reason, most important parts of the communal space (kitchen and dining room) had to be designed on this level as well.

Also the typical doorstep, in this case three treads, turns out to be a challenge. To guarantee long-term accessibility, lava and BURO II & ARCHI+I suggest to add an informal entrance at the back of the lot. Before adding a ramp within the building, they argue that an entrance from the back might be a more affordable option.

Table 1: Several modes of sharing space (Source: Authors)

<table>
<thead>
<tr>
<th>Collective use of space</th>
<th>Stramien</th>
<th>a2o</th>
<th>Lava 1</th>
<th>Lava 2</th>
<th>BURO II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared living space</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>kitchen</td>
<td></td>
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<td></td>
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<tr>
<td>dining room</td>
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<td></td>
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<tr>
<td>living room</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Shared entrance inside</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Shared outside space</td>
<td></td>
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<td></td>
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<tr>
<td>Shared service space</td>
<td></td>
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</tr>
</tbody>
</table>

Despite the fact that all designers enlarged the surface of the building, private and collective use of space remains a challenge within the design of a multigenerational dwelling (Table 1). BURO II & ARCHI+I takes privacy as the starting point for their design. By consequence, each household receives a small, but fully equipped apartment. Cooking and eating together with all inhabitants is an option, but never forced. Concerning the mode of sharing, lava’s horizontal design is comparable. The vertical version however is different. Again, each household receives all space to function independently, but the various functions are spread around the whole house. In this sense, interaction between all inhabitants is imposed, but joint activities as cooking are never obliged. The spatial design of the multigenerational dwelling becomes a trigger for social interaction, without a total loss of privacy for the inhabitants. a2o goes a step further by their decision to design a communal kitchen and no private ones. Stramien does the same, and argues that joint activities (e.g. cooking and eating) are central to communal housing concepts, such as multigenerational dwelling.

According to lava, the quality of multigenerational dwelling in general and the shared use of interior and exterior space more specifically, even improves when it is designed on the level of the neighborhood. For example, coupling two terraced houses, creates the opportunity to combine the vertical circulation. Additionally, service space (garage, technical space) and outdoor space (garden, balcony) can easily be used and organized as ‘soft’ ways of cohabitation for more
than three households. During our focus session, Stramien argued, that lavas’ approach on the level of the neighborhood might be the starting point and generator for additional communal activities. In literature (McCamant & Durret, 1994) this is referred to as ‘retrofit cohousing’. Retrofit cohousing involves making use of existing buildings, creating new, cohousing patterns of a shared life together. There are examples of retrofit cohousing which have been created in industrial buildings, urban and suburban neighborhoods, and farms.

Figure 3: Multigenerational dwelling on the level of the neighborhood (Source: Authors)

Summarized, several modes of sharing are possible within terraced housing (Table 1). Naturally it is not our ambition to find the right balance between communal and private space, but to demonstrate that several options are possible within a typical terraced house in Flanders. Still, our focus session at the end of the workshop showed that privacy remains one of the most important factors. Especially Stramien argued that multigenerational dwelling is not suitable for any kind of household, and considered their design as very specific for the predefined clients and users. Knowing that privacy not only differs between individuals, but that it also shifts from day to day, most designers introduced a certain spatial flexibility within their buildings. For example, a2o designed separate staircases and Stramien planned mobile walls to regulate the privacy of individual inhabitants of the dwelling.

In fact we found out that several ‘constituents’ regulate privacy and communal living in one and the same building. According to Binder et al. ‘constituents of the object of design are in fact a primary source of knowledge about the way the final building took form’ (Binder et al., 2011: 60). These constituents can help future designers during the starting phase of designing communal housing project in general, and multigenerational dwellings more specifically. However, discussing possible constituents for the design of multigenerational dwellings with the designers involved in the workshop turned out to be difficult. Hence, finding the primary generators (Cross, 2006) within each design approach is one thing, finding joint constituents is another. Perhaps, our vocabulary is the biggest obstacle while weaving ‘the web of constituents’. Yet, we are working on something beyond our common consciousness. In fact we have to change our consciousness. According to Harvey (2010), discussing possible futures can be done through the development of a very own language or poetry. Even though he talks about urbanization, it becomes clear that future multigenerational dwelling will only become possible if it is prepared and substantiated with a new vocabulary.
CONCLUSION

Several conclusions could be drawn from this investigation. First, it makes a case for multigenerational housing in Flanders and it shows that this ‘new’ housing concept could just become a reality. On various levels, multigenerational housing is a realistic option. For traditional terraced housing in Flanders, it is an interesting way to cope with contemporary issues such as sustainability, adaptive reuse of existing fabric, and even conservation. Nevertheless, housing policy and spatial planning in Flanders must change in order to stimulate these new ways of cohabitation, instead of being obstacles before, during and after the design process.

Second, by introducing research by design, aspects of multigenerational housing were tested in a real context, i.e. an existing house. New knowledge was generated through research by design. It shows that different modes of sharing are possible within such a house. Design turned out to be a useful method to transcend traditional research. During the workshop, interaction between researchers and designers generated an overview of specific architectural approaches to realize different modes of sharing space. Through the process of designing a multigenerational dwelling, we found interesting approaches which were used as a conceptual basis to find the right balance between privacy and community. In this sense, design practice proves to be essential to making a contribution to the formulation of theory which is inherently architectural. For example, Stramien’s privacy gradation through separating the dwelling into a day and a night zone, Lava’s vertical ‘slice’, connecting private rooms throughout the building, and a2o’s dual circulation strategy, would have stayed out of reach in more traditional research.

Third, in order to refine for example the balance between privacy and community that is so important in communal housing, some efforts were undertaken to find a common language to discuss issues of privacy and community. On this point specifically, more research is needed. And maybe, the right balance can only be found in a participatory process (Sanoff, 2008), with real clients and final users of the multigenerational dwelling. Additionally, more research is needed on what the exact constituents of multigenerational dwelling are. It has become apparent that practicing architects work within a certain design vocabulary they once learned themselves. Subsequently, the necessity arises to develop a new vocabulary which suits better to the letter and spirit of new housing concepts, such as multigenerational dwelling. For this purpose we are in need of new theoretical research. Eventually, the dialogue between architects and clients will gain from a common language or vocabulary to define for example the right balance of privacy and community.

Fourth, research by design might well be a means to test intentions of a certain government in a real, empirical situation. The difference between objects and things, as explained above, could be very instrumental to this. The traditional terraced house, while being a subject of this study, is not just an object anymore, but also a thing. The other way around, complex issues, which gather many actors around them (such as multigenerational housing) could be made transparent through research by design, that is, by focusing on a particular case. So objects become things, and things can be made comprehensible for architects and clients by means of entities that look like simple objects at first. Knowledge is being exchanged between the singular and the more generic (and sometimes idealistic). New and sometimes very unexpected knowledge concerning the social aspects of housing, existing houses, the way houses can function within neighborhoods, and so on, is being generated in between objects and things. Thus, the specific design knowledge architects have is able to inform the higher levels of policy making, and vice versa (De Ridder & Gerards, 2014). Research by design acts as a mediator, which actively generates knowledge, and is therefore a very rewarding method.

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TRADITIONAL VALUES AND THEIR ADAPTATION IN SOCIAL HOUSING DESIGN: TOWARDS A NEW TYPOLOGY AND ESTABLISHMENT OF ‘AIR HOUSE’ STANDARD IN MALAYSIA

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Abstract
Large migration from rural areas to urban areas like Kuala Lumpur has led to some implications for economic, social and cultural development. This high population has placed enormous demand on the existing housing stocks, especially for low-income groups. However, some issues arise, one of which is overheated indoor air temperature. This problem contributes to the high-energy usage that forces huge sums of money to be spent on cooling the house by using mechanical equipment. Therefore, this study focuses on thermal comfort in social housing, and incorporates traditional values into its design to achieve a certain measurement of natural ventilation in a house. From the study, the carbon emission and energy consumption for an air-conditioned house is 67%, 66% higher than a naturally ventilated house. Therefore, this research has come up with a new typology design, which has a large exposed wall area and full-length openings on the opposite walls to increase cross ventilation. At the end of this research, the measurement of thermal comfort for a naturally ventilated building called ‘Air House’ has been identified.

Keywords: Vernacular Architecture; Traditional Malay House; Air House; Sustainable Design; Social Housing; Malaysia

INTRODUCTION
Malaysia is located in Southeast Asia and is one of the fastest developing countries in the world. United Nations calculations have projected a dramatic urban future for this region (Salih 1982). The patterns of urbanization in Southeast Asia’s top cities are expected to increase rapidly.

Kuala Lumpur, as a capital city of a developing nation, plays a significant role in the urbanization and development of the country. The city’s population grew from about 0.32 million in 1957 to almost 1.62 million in 2006 (Mohit, et al., 2010). Based on this situation, Malaysia was expected to require about 709,400 new housing units between 2006 and 2010 (UN-HABITAT, 2011). The other problem that has arisen is the increasing number of squatters and slum areas. Social housing schemes such as People’s Housing Project (PHP) have been one of the approaches undertaken by the government to solve this problem. However, the issue of thermal comfort and space design in social housing is always a hot topic as it is not compatible with the living patterns of Malaysian society.

The low-income population that occupy the majority of social houses cannot afford to install and maintain an air-conditioning system in their homes. The system leads towards environmental pollution and energy waste. Therefore, one of the precedent studies is the traditional Malay house that has touted the advantages of maintaining the internal comfort level by natural and passive approaches.

The aims of this research are to seek the appropriate design methods in social housing that can achieve the right thermal comfort by using passive approaches. Thermal comfort is very important, not only for enhancing the quality of indoor living, but also because it can help to reduce carbon emission and energy consumption. At present, the thermal comfort conditions have been set up for indoor space designed with an air-conditioning system. Therefore, this
research tries to find the best description of thermal comfort conditions for a naturally ventilated space that suits Malaysia’s environment and comfort zone.

MALAYSIAN VERNACULAR ARCHITECTURE AND ITS RELATIONSHIP TO CLIMATE

Vernacular Architecture of Traditional Malay House

The construction elements in Malay vernacular architecture are light timber-framed structures, forming elevated floors, sloping long roofs with large overhangs, louvered windows, timber or woven bamboo walls and screenings (on the upper walls). In terms of spatial elements, the basic spaces of the serambi, rumah ibu and dapur are the most common in a traditional Malay house (Figure 1). Although these houses have variations, elements such as spatial, functional and physical could be determined as the most common among them (Ismail & Ahmad, 2006).

The traditional Malay house can be divided into front and back sections, which are centred around the rumah ibu (the core house) and the dapur (kitchen) respectively (Yuan, 1987: 34). The serambi, in any event, will be at the front, followed by the rumah ibu and dapur. This arrangement is similar in all Malay houses and closely reflects the social interaction in Malay communities. Table 1 shows the common uses and privacy levels of interior spaces in a traditional Malay house.

Table 1: The uses and privacy levels of spaces in a typical traditional Malay house
(Source: Authors)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Activities</th>
<th>Privacy Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serambi / Anjung (Veranda / Porch)</td>
<td>Male entrance, relaxing, child monitoring, greet and treat space for guests</td>
<td>Public space</td>
</tr>
<tr>
<td>Rumah Ibu (The Main House)</td>
<td>Meeting, praying, reading/reciting, sleeping (at night)</td>
<td>Semi private and private space</td>
</tr>
<tr>
<td>Dapur (Kitchen)</td>
<td>Cooking, preparing foods, dining, washing</td>
<td>Private space</td>
</tr>
<tr>
<td>Kolong (Space underneath the house)</td>
<td>Storing, working, repairing, drying clothes (rainy season)</td>
<td>Public space</td>
</tr>
</tbody>
</table>

The serambi is the smallest space among the other spaces. In some cases of the twelve-column house, this space usually accommodates a quarter of the house, and the floor level will always be lower than the rumah ibu floor level. The form of the serambi is usually rectangle and in some cases is an extraordinarily long narrow space (Chen, et al., 2008).

This area can be constructed with or without perimeter walls; however, it tends to look like a semi-outdoor space with numerous daylighting from the openings. Figure 2 shows the location of serambi space in two examples of Malay houses. The serambi in the house of Andak Endah has no walls, while the other serambi in the house of Tan Mas Mohar is built with walls.

The importance of the serambi is to serve as the first greeting space for guests after entering the house (Yuan, 1987). In a traditional Malay kampong, houses are built in random positions but can be seen from the distance. The serambi in this case will be the place for social interaction within the neighbourhood, and for parents to monitor their children playing in the yard.

The rumah ibu is the core space of the Malay house. This has the largest area, highest floor level and highest roof level (Yuan, 1987: 37). In respect of the needs and privacy of family members, bedrooms are provided, but the number is flexible and depends on family size (Figure 2). Lighting in this space is reduced to provide coolness. (Yuan, 1987).
The *rumah ibu* is usually used for official events and a place for treating well-known guests or close relatives. Official ceremonies relating to customs are also carried out here. These include engagement, marriage and wedding ceremony. On normal days, this space will be for relaxing, reading, mingling with other family members, and for use as a sleeping area at night (Chen, *et al*., 2008).

The kitchen, or *dapur*, is always situated at the back of the house (Yuan, 1987: 38). The functions of this space are for cooking, washing and eating. The basic layout of a Malay house will include a *dapur* within the *rumah ibu*, but in some cases the *dapur* will be connected with a *pelantar*, a roofless platform, or a *selang*. This, on the other hand, is an enclosed space that serves as a walkway and used as a second entrance for females during a ceremony (Figure 2). Although the *dapur* is the last space in the house, it holds the prestigious function of family gatherings where dining takes place together with other family members. Therefore, the *dapur* has a large space, which is considered the second largest in a Malay house.

![Figure 1. The internal layout of Andak Endah House, 1920 (Source: Authors)](image-url)
Adapting to the Climate

The uniqueness of a Malay house is that it is built on stilts. This approach in many ways has several benefits from a thermal, functional and safety point of view. The raised floor, which is built higher than the ground, can catch winds of a higher velocity (Yuan, 1987: 71), and the use of timber planks for the floor, which have gaps between them, can bring the air to the inner space. Hanafi (1994) suggests that moist ground requires more sunlight to dry, and a raised floor is one of the solutions. The wet climate does not just make the ground damp but can also cause floods. Therefore, stilt heights vary between Malay houses located in the northern and southern regions.

Several research findings about stilt heights in traditional Malay houses have proved those in the northern region have more height than those in the southern region (Figure 3). The underneath space allocated by the raised floor can provide shelter for the livestock, working space, and a clothes-drying area during rainy seasons.

A traditional Malay house allows ventilation by having many full-length windows and doors at body level (Yuan, 1987: 76). Hassan and Ramli (2010) conclude that the large number of windows and openings aided by ornamentation at the perimeter walls can contribute to the cross ventilation process (Figure 3). However, further analysis by the same authors (2010) reveals that large openings on Malay house walls create high air intakes outside to reduce the performance of the stack effect.

Roof space in a traditional Malay house is properly ventilated by the provision of ventilation joints and panels in the roof construction (Yuan, 1987: 75). As one of the indigenous materials, the attap roof used in Malay houses has a low thermal capacity. This material does not retain heat and cools immediately. Another climatic responsive design of a double-slope roof is its gable ends. Having various motive designs, this component also has ventilation panels which allow air to flow into the roof space and cool the house (Yuan, 1987:111).

From the two examples in Figure 3, the roof overhangs in the Andak Endah house range from 1000mm to 1500mm, and the Datuk Baginda Tan Mas Mohar house has overhangs ranging from 1400mm to 1600mm. Large overhangs and the low exposed vertical areas (windows and walls) in a traditional Malay house provide good protection against driving rain, good shading, and allow the windows to be left open most of the time for ventilation (Yuan, 1987). Meanwhile, the roof angle for both cases ranges from 30° to 60°. The steep roof angle is used to quickly drain
off any rain falling onto the roof surface before it seeps through the layers of thatching (Lee, 2003:251).

Figure 3. The difference of stilt height and roof angle in traditional Malay houses at northern and southern region of Malaysia (Source: Authors)

Architectural And Construction Issues of People’s Housing Project (PHP) Schemes

Malaysia is one of the developing countries experiencing a highly rapid urban growth. This situation has led to large migration from rural to urban areas, and resulted in the existence of slums and squatter areas. Social housing such as the People’s Housing Project Scheme (PHP) is one of the initiatives by the government to solve this problem. The National Housing Department of Malaysia (JPN) has a standardized social housing design in Malaysia to ensure that the basic requirements of providing adequate accommodation for low-income families are achieved. Figure 4 shows the design of a unit of PHP 2000. The size for the unit is 130 square feet per person (JPN, 2006) or 650 square feet in total (60.38 square metres). This figure is for an average family member of 5 persons per unit (Goh & Ahmad, 2011). As the demand is very high, hundreds of thousands of PHP schemes have been built since 1998. However, the PHP design has received a lot of criticism for its insufficient space size and location.

Amongst the architectural issues reflected from the PHP design is the lack of a storage area. Therefore, the majority of residents placed their goods in front of their house; this affects the efficiency of a corridor as a safety route. The main door unit located abutting the corridor without any recess reduces the opportunity of neighbourhood interaction. Meanwhile, the small size and deep location of the kitchen and yard restricts its functions. The orientation of unit layout that has a minimum external wall area minimizes openings and air movement. The internal layout of the PHP 2000 that has complicated partitions reduces cross ventilation. Furthermore, openings such as aluminium casement windows without top louvers does not allow air movement to enter the indoor space.

On the other hand, the insufficient location of the bathroom and bedroom doors reduces the privacy level of residents. In the PHP design, the toilet and bathroom areas are separated, meaning a restriction in air and people movement in these spaces.

Furthermore, heavyweight materials with a high heat storage capacity are not suitable to a warm-humid climate like Malaysia. These materials take a considerable time to heat, then once heated take a long time to cool down again (Saini, 1970). Thus, lightweight materials that have a low heat storage capacity should be observed and replaced by conventional materials. In conjunction with that, prefabricated construction methods could be implemented in PHP 2000 to make it flexible in terms of internal space layout.
Materially, brick wall and post and beam concrete are the most common construction methods for social housing in Malaysia, largely due to these materials being cheap and easily available. Brick construction has a low u-value of 1.96 W/m²K, though it has an eight-hour time lag, which has an adverse effect on the internal environment, especially at night (Hanafi, 1994). Saini (1970) suggested that in a warm-humid region, heavyweight construction is at a disadvantage since the cooling process at night is so slow that the indoor temperature is kept too high for a comfortable sleep. Therefore, materials with a high heat storage capacity, such as brick, concrete and stone, have no advantage in Malaysia’s climate.

In addition, the residents of PHP flats agreed that the adjustable louvered windows are better for air movement compared with aluminium casement windows (Goh & Ahmad, 2011). Recently, the shortage of construction labour means prefabricated panels and frames have been used widely. In 1988 the Malaysian Government began efforts to persuade the construction industry in Malaysia to engage with a more systematic approach, such as an Industrialized Building System (IBS), in building construction (Abd. Rahman & Omar, 2006). Besides the aims to reduce the dependency on foreign labour, an IBS construction method can also contribute to reducing construction periods and pollution of the environment.

CASE STUDIES ANALYSIS
Case Studies Background

Three case studies have been selected, two of which are traditional Malay houses, and the other a social house from the People’s Housing Project Scheme (PHP 2000). The Malay houses selected are the house of Datuk Baginda Tan Mas Mohar and the house of Andak Endah. The houses are located in two different areas; the house of Datuk Baginda Tan Mas Mohar in the Negeri Sembilan state (southern region) and the house of Andak Endah in Perak state (northern region).

The house of Datuk Baginda Tan Mas Mohar, built in 1850, and the house of Andak Endah, built in 1920, have been chosen as typology houses and represent two different forms. The house of Datuk Baginda Tan Mas Mohar has a basic twelve-column structure, while Andak Endah has an expanded twelve-column structure. Social housing in Malaysia has been
standardized, so using the People’s Housing Project (PHP) as the third case study is quite reasonable.

Table 2 shows the total external wall area and its opening areas percentage. The Datuk Baginda Tan Mas Mohar house has 16.5% opening areas and the house of Andak Endah has 17.9% opening areas. Meanwhile, PHP 2000 has only 8.9% opening areas. The size and location of opening areas are two key factors that can allow air to enter the building sufficiently. The two cases of Malay houses have larger opening areas compared to PHP 2000.

Table 2: Total external wall areas and opening areas in all case studies (Source: Authors)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>Location of Simulation</th>
<th>External Wall Areas (m²)</th>
<th>External Opening Areas (m²)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>House of Tan Mas Mohar</td>
<td>Kuala Lumpur / Subang</td>
<td>485.9</td>
<td>80.0</td>
<td>16.5</td>
</tr>
<tr>
<td>House of Andak Endah</td>
<td>Kuala Lumpur / Subang</td>
<td>259.0</td>
<td>46.4</td>
<td>17.9</td>
</tr>
<tr>
<td>A Unit of PHP 2000</td>
<td>Kuala Lumpur / Subang</td>
<td>117.4</td>
<td>10.5</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Simulation’s Design Settings

The selection of the 6.4 version of the Integrated Environmental Solutions Software (also known as (IES <VE>) is due to its suitability towards the aims of the study, which is to simulate air temperature, relative humidity and air flow rate. For natural ventilation, MacroFlo, integrated into the IES simulation, is used to simulate airflow driven by wind pressure and buoyancy forces through elements such as windows, doors and openings. The simulation of MacroFlo runs from within Apache, which also simulates the indoor air temperature and relative humidity based on the ASHRAE design weather database. Meanwhile, MicroFlo uses a Computational Fluid Dynamic (CFD) to measure fluid flow and heat transfer processes around building spaces, which include the effects of climate (IES, 2012).

In this study, the simulation’s location database is Kuala Lumpur/Subang weather with the latitude 3° 12’ North and longitude 101° 55’ East. The sea level height is 8 metres with the mean dry-bulb temperature 36.4 and wet-bulb temperature 16.1 °C. No HVAC system is applied, while east-west orientation is used in all simulation models. The openings of all samples assigned as window/door side hung with opening angle is 90°, and opening hours range from 08:00 am to 10:00 pm. All the external walls are categorized as exposed walls without any obstacles.

According to Saini (1970), air temperature, relative humidity and air movement are the elements of climate which affect the comfort and well-being of the people. These factors also have complex inter-relationships between them, and, to a degree, each affects the other. Therefore, in this study, these three elements will be measured in detail, as well as carbon emission and energy consumption.

Simulation’s Results

From the simulation’s analysis, it can be deduced that the air temperatures in PHP 2000 and Malay houses show no significant difference within each other. The mean air temperatures obtained are within the comfort levels of 25.0 to 28.0 °C. However the relative humidity results are higher than their suggested level of 30% to 60%. Even though the relative humidity is high, there is only a small change in the air temperature. A change from 25 to 75% of relative humidity is predicted to move the temperature by only 1°C (Fisk, 1981).

The crucial finding obtained from the simulation is the air movement. Air movement in this scenario is very important because it can encourage heat loss through the evaporation process.
Low air movement does little to generate a body’s heat loss. Furthermore, Fisk (1981) suggested that air movement of about 150.0 l/s (0.15 m/s) or greater tends to increase air temperature and a body’s heat loss. In conclusion, a traditional Malay house that has high air ventilation movement in and out has the better shelter and can provide more comfort to the human body than PHP 2000.

Table 3 shows the comparison of carbon emission and energy consumption for two different PHP 2000s. One unit uses an air conditioning system, the other is fully naturally ventilated. Both carbon emission and energy consumption for the PHP 2000 with an air conditioning system are higher than the PHP 2000 that uses natural ventilation. The carbon emission and energy consumption for the air-conditioned house is 67% and 66% higher than the naturally-ventilated house.

The huge gaps here show that it is worth encouraging people to use natural ventilation methods rather than an air conditioning system. Malay houses, for instance, can best describe the concept of a naturally ventilated house. Therefore, some elements, such as the size of openings and their placement, can be forwarded to a detailed level.

<table>
<thead>
<tr>
<th>Variables</th>
<th>PHP 2000 (With Air Conditioning System)</th>
<th>PHP 2000 (Naturally Ventilated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Emission (KgCO₂/Year)</td>
<td>18,308</td>
<td>5,967</td>
</tr>
<tr>
<td>Energy Consumption (MWh/Year)</td>
<td>20.20</td>
<td>6.8</td>
</tr>
</tbody>
</table>

TOWARDS A NEW TYPOLO GY OF SOCIAL HOUSING DESIGN AND THE ESTABLISHMENT OF ‘AIR HOUSE’ STANDARD IN MALAYSIA

Theoretical Model of A New Social Housing

A theoretical model (TM) has been developed as an initiator towards sustainable social housing in Malaysia. The model design is a reflection of the design issues found in PHP 2000 that were discussed before. The issues of space sizes, internal circulation, cross ventilation and numbers of openings in PHP 2000 have been taken into consideration. PHP 2000 and TM have the same overall area of 650 square feet, which is equivalent to 60.38 square metres (JPN, 2006).

Several architectural improvements have been implemented in the TM design, which involve the external and internal design forms. In TM the living/dining area is smaller than in PHP 2000 to allow foyer space in front of the main entrance. This space has a similar position to the serambi in a Malay house to promote interaction between neighbourhoods. The other improvement in TM is a larger yard space than in PHP 2000. This is because in PHP 2000, the yard design is too small and located too far from the exposed area, which leads to insufficient space for a clothes-drying area. On the other hand, the separation of the toilet and bathroom in PHP 2000 means the toilet size becomes too small and uncomfortable. In TM, both facilities are located in the same space; thus it creates better movement of the occupant and air.

Because the humidity is high, air movement is crucial to help perspiration to evaporate (Bureau of Meteorology, 2012). Hence, TM has been designed with windows opposite each other, a narrow floor plan and ventilation openings such as top and bottom louvers to allow air movement. The complicated wall arrangements in PHP 2000 reduce the cross ventilation that flows from the front to rear façade. In TM, cross ventilation is achieved with a parallel arrangement of windows as well as the placement of high louvers on the internal walls, as shown in Figure 5. Furthermore, overhangs are placed on top of the windows to provide protection from sunlight and rainfall. The width of the overhang in TM is 600 mm but none in PHP 2000.
Window design in a traditional Malay house is divided into three operable sections, which are top, middle and bottom. As shown in Figure 6, TM has 3.5 metre-high walls, and its external walls are divided into three sections. The sections are top louvers, windows and bottom louvers. In a Malay house design, some openings on the gable ends are placed to allow air movement. Thus, in TM, the same concept is translated through the placement of internal and external high louvers.

In a hot-humid climate, a lightweight structure performs better as it cools down rapidly (Saini, 1970: 25). Furthermore, ‘materials with heat-storage capacity such as bricks and concrete have little benefit’ (Bureau of Meteorology, 2012). In TM, lightweight materials such as a gypsum board with insulation is used for the external wall. Meanwhile, for the internal wall, plasterboard...
with insulation is the replacement for the conventional single brick wall. In a hot-humid climate, a thin insulation is preferable to bulk insulation, which is not desirable because it prevents the house cooling down at night (Bureau of Meteorology, 2012).

In conclusion, the TM design that has been applied with architectural and construction improvements has now become one of the new typologies for social housing in Malaysia. Therefore, the changes applied in TM should be tested and analyzed in IES <VE> software to assess their suitability. All the settings and simulation variables mentioned before will be used in order to provide a fair comparison.

**Results and Findings**

The main findings from the results are:

a) The mean air temperature in Malay houses and TM ranges from 25.2°C to 27.2°C. This range can be considered the best air temperature in a naturally ventilated building in Malaysia.

b) The minimum relative humidity in Malay houses and TM ranges from 30% to 60%. This range is achievable and therefore can be considered the preferred humidity range in a naturally ventilated building.

c) The mean internal ventilation in Malay houses and TM cases (except the *dapur* and *serambi*) ranges from 0.15 to 0.4 m/s (150.0 to 400.0 l/s). Meanwhile, the external ventilation in Malay houses and TM (except the *dapur*) ranges from 0.30 to 1.45 m/s (300.0 to 1450.0 l/s). Thus, the preferred range of air ventilation in a naturally ventilated building is 0.30 to 1.50 m/s.

d) The external opening area in a Malay house is 15% to 20%, while in TM, the opening areas on the walls facing outside (open space) is 25% and the wall facing inside (corridor) is about 50%. These percentages could be the best configuration of opening percentage in a naturally ventilated building.

e) The best carbon emission for a naturally ventilated building is 2571 kgCO2/year, and the energy consumption should not be more than 5.1963 MWh/year.

The findings listed above are the initial parameters than can be used as the first Air House standard in Malaysia.

‘Air House’ Standard for Naturally Ventilated Building in Malaysia

Based on all the results defined in Malay houses and theoretical models, the proposed Air House design standard is listed in Table 4. The air temperature ranges from 25°C to 27°C. The relative humidity for ‘Air House’ is 30% to 60%. Meanwhile, the air movement is between 0.30 to 1.50 m/s. The total energy consumption for Air House standard is less than 5.0 MWh/year and less than 2500 kgCO2/year for carbon emission.

Table 4: The initial design conditions of ‘Air House’ for naturally ventilated building (Source: Authors)

<table>
<thead>
<tr>
<th>Recommended Air Temperature</th>
<th>25°C – 27°C</th>
<th>77.0°F – 80.6°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Design Relative Humidity</td>
<td>30% - 60%</td>
<td></td>
</tr>
<tr>
<td>Recommended Air Movement</td>
<td>0.30 m/s – 1.50 m/s</td>
<td>300.0 l/s – 1500.0 l/s</td>
</tr>
<tr>
<td>Energy Consumption</td>
<td>Less than 5.0 MWh/year</td>
<td></td>
</tr>
<tr>
<td>Carbon Emission</td>
<td>Less than 2500 kgCO2/year</td>
<td></td>
</tr>
</tbody>
</table>

Table 5 shows the design parameters for a naturally ventilated building in Malaysia. 15% to 25% of an opening area is recommended for an external wall that faces an open space, while for a wall covered by shade or facing another block, 25% to 50% of an opening area is recommended. As higher altitude provides higher velocity, the units located on the eleventh floor and above should have a smaller opening area than units on the first to tenth floors. Furthermore, to promote air movement and cross ventilation, the four components of opening in Air House that
should be implemented are bottom louvers, windows, top louvers and high louvers. The proportionate rule of these openings is $2x : 2x : 1x : 1x$ relatively, as shown in Figure 7.

Moreover, the unit plan layout should be in proportion of $1.5x$ for walls parallel to the corridor, and $1x$ for walls perpendicular to the corridor (Figure 7). To provide shade from sun radiation and rainfall, the minimum overhang recommended is 0.6 metres, while to promote better air circulation around the building, breaks between units are recommended. In terms of material selection, Air House standard uses prefabricated, lightweight and low thermal mass materials for the walls, floor and roof components.

Table 5: ‘Air House’ design parameters for natural ventilated buildings in Malaysia (Source: Authors)

<table>
<thead>
<tr>
<th>‘Air House’ Design Parameters</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of Opening Components (Bottom Louvres : Windows : Top Louvers : High Louvres)</td>
<td>$2x : 2x : 1x : 1x$</td>
</tr>
<tr>
<td>Opening Areas for Walls Facing Outside (1st Floor to 10th Floor)</td>
<td>15% to 25% (from total external wall area)</td>
</tr>
<tr>
<td>Opening Areas for Walls Facing Inside (1st Floor to 10th Floor)</td>
<td>25% to 50% (from total external wall area)</td>
</tr>
<tr>
<td>Opening Areas for Walls Facing Outside (11th Floor and above)</td>
<td>10% to 20% (from total external wall area)</td>
</tr>
<tr>
<td>Opening Areas for Walls Facing Inside (11th Floor and above)</td>
<td>20% to 45% (from total external wall area)</td>
</tr>
<tr>
<td>Proportion of Plan Unit Layout (Parallel Wall : Perpendicular Wall)</td>
<td>$1.5x : 1x$</td>
</tr>
<tr>
<td>Range of Overhang’s Depth</td>
<td>0.6 - 1.0 meter</td>
</tr>
<tr>
<td>Breaks between Units</td>
<td>2.0 meters</td>
</tr>
<tr>
<td>Recommended Materials</td>
<td>Prefabricated, Lightweight and Low Thermal Mass</td>
</tr>
</tbody>
</table>

Figure 7: ‘Air House’ Design Parameters Diagram (Source: Author)

**Conclusions and Recommendations**

As a conclusion, there are some design issues discovered in traditional Malay houses and social housing. According to research, materials that are used in Malay houses are more practical and reliable for releasing heat readily, compared to high thermal capacity materials such as bricks and concrete in social housing. These high thermal materials store heat and cause uncomfortably high temperatures at night.

In a traditional Malay house, full-length openings are located at body level, while in modern housing the openings are smaller and only concentrate on the upper part of the body.
Therefore, the cross ventilation process often fails in modern housing. Overhangs are important in opening components because they can provide shade for the walls from sun radiation, glare and rainfall. This key element is always neglected in modern housing.

For religious reasons, the orientation of a traditional Malay house normally faces Mecca or an east-to-west direction. This orientation, by coincidence, can reduce the external wall that faces direct sunlight. However, in modern housing, this orientation is not emphasized for profit motives. Moreover, the internal space arrangement in a traditional Malay house uses a front-to-back order where the serambi is the first area, followed by the rumah ibu and dapur. This arrangement preserves the privacy level of a Malay family and contributes to neighbourhood enhancement.

The results of the analysis of Malay houses and People's Housing Project (PHP 2000) show that the performance of air temperature and relative humidity in both cases were not significantly different. However, for internal and external air ventilation, the traditional Malay houses recorded 1,450.3 l/s (1.45m/s) compared to just only 31.7 l/s (0.03m/s) for PHP 2000. The massive amount of air ventilation in Malay houses contributes to a better performance of the house thermally and economically.

The theoretical model has been developed and tested. The model has been improved according to the architectural and construction issues found in an actual PHP 2000. One of the major improvements is the proportionate rule of layout unit. Instead of a long and narrow layout, the theoretical model has a longer and wider layout where the external wall area is longer than PHP 2000; this promotes massive airflow in, out and across the house through the opening components.

Using the results obtained from the analyses, a standard called Air House has been defined. This standard is totally focused on natural ventilation strategies, in which air is designed to flow across the house compound. Meanwhile, in ‘Passivhaus’, the design is more about airtightness and isolation of heat within the house compound. The establishment of ‘Air House’ could perhaps be a new beginning for Malaysian architecture and its tropical region.

The hot temperature and high humidity climate in Malaysia encourages the use of an air conditioning system as the primary option to cool the house. Nowadays, this is the standard practice in Malaysia. An effort should be made to rectify this situation. The theoretical model that has been developed proves that there is a possible way to achieve the right thermal comfort by using passive methods in social housing. Therefore, this study answers the problem posed at the beginning of the study.

Upon completion of the study, it can be deduced that there is a huge gap between the traditional approach and modern housing. One of the reasons for this situation is the inappropriate regulations and standards being used in Malaysia. Therefore, some improvements and revisions should be made in order to meet the current challenges, as some of the regulations are not compatible with Malaysia’s climate and culture.

In clauses 32, 33, 34 and 35 of Uniform Building By-Law (UBBL) Part III (space, light and ventilation), open spaces must be provided in residential building compounds. However, the categories listed are only related to buildings abutting a street, a back lane and a detached building; there is no category relating to linked units abutting a corridor in a multi-story building. According to the research findings, a common space in front of the main entrance is an important element in building a good, responsible society. Therefore, in theoretical model (TM), foyer space is provided to serve as interaction space as well as storage area. Thus, an improvement that can be compatible with local culture and the basic needs of the people should be made.

Clause 39 (1) states that residential buildings shall be provided with natural lighting and natural ventilation. The openings area is not less than 10% of floor area. For an example that follows the minimum requirement, a living/dining area in TM that has 19.6 square metres will have an area of window opening of less than 2.0 square meters. Based on the research findings, this percentage is too small for an opening to allow air movement. As TM has been proven to provide good air movement, clause 39 (1) should be revised to a new and more suitable percentage of opening area that is compatible with Malaysia’s climate.
In order to achieve thermal comfort through air movement, a large opening at the external and internal wall should be made. Therefore, 15% to 20% of external openings are required on an external wall for achieving suitable amount of air movement. Moreover, an opening at a high level of wall should be placed to allow ventilation and air change processes.

The window openings are suggested to be placed at body level range and must be 15% to 20% of a room’s external wall. For internal partitions, fixed louvers could be placed on the top part of the partition to allow air transfer from room to room.

Moreover, in clause 42 (2), the minimum kitchen area in UBBL is 4.5 square metres and the minimum width is 1.5 metres. This measurement is still small and leads to insufficient space area. Therefore, the kitchen area should be revised to be at least 8.0 square metres and 2.0 metres minimum in width.

Finally, in clause 44 (1), the minimum height of a living room is 2.5 metres, while a kitchen is 2.25 metres. These heights are considered low and less efficient to promote air movement; thus, the minimum of 3.5 metres, as in TM’s design, should be used in this clause.

The Air House concept that focuses on natural ventilation in residential buildings has proven it can reduce 86% of carbon emission and 74.3% of energy consumption compared to standard practice. The Air House concept has brought sustainable design in Malaysia to a new level of achievement; therefore, it should be explored and expanded in greater detail in the future.

Thermal comfort is one of the basic needs. However, in urban areas, thermal comfort becomes more crucial as houses are constructed in multi-level format with compact design. The concept of Air House could perhaps provide a new dimension in the design of comfortable and sustainable housing in the future.

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CULTURAL TRADITIONS AND ARCHITECTURAL FORM OF ITALIAN TRANSNATIONAL HOUSES IN AUSTRALIA.

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Abstract
The purpose of this article is to investigate the connection between cultural traditions and house form which, according to scholars, is in danger of being lost, and so contribute to the revival of critical interest in such a connection. This paper does not intend to focus on the exploration of the relation between culture as a way of life and the spatial form of the house. Instead, the main objective of this paper is to gain a deeper understanding of the nature of vernacular architecture in a precise context: this study will be focusing on the architectural form of vernacular houses built in Brisbane in the post WWII period by first generation Italian migrants, namely upon the way the house’s structure, materials and construction technique, decorative feature on the façade, were influenced by migrants’ cultural traditions.

Keywords: Migration; culture; way of life; cultural traditions; house form; vernacular houses; transnational houses

BACKGROUND
The literature reveals that despite buildings having been seen as an expression of people’s and societies’ cultural-traditional factors since the early days of civilization and the role of culture as a determinant factor in shaping the built form has also been acknowledged by modern theorists, scholars and practitioners stress that the intense complexity of human motivation that has generated architecture is being neglected in contemporary architectural design.

For example, Paul Oliver highlights how in the design of a housing project in Ghana, to be developed to allow the Gurundi and Tallensi tribes people to resettle before their lands were engulfed by a lake formed by the Volta river dam, the way of life of the inhabitants was not given much consideration. Also he stresses the need to not ignore cultures in the design of housing. ‘The new housing which was designed for them was modern but I was shocked by the total lack of consideration for the existing way of life of the people.’ (Oliver, 1997, p. vii).

The lack of consideration of socio-cultural factors, which had a determinant role in shaping traditional Arab settlements, has also been highlighted by Al-¨Thahab, Mushatat and Abdelmomen in their study about domestic architecture of contemporary Iraq. ‘It is important to investigate, analyse and study the neighbourhood unit according to the socio-cultural aspects of the human in order to create a relevant social context ...’ (Al-Thahab, Mushatat, & Abdelmomen, 2014, p. 248).

The architect may design responsibly, but the process fails when he ignores the values, building skills, experience and wisdom of the cultures whose housing’s needs are to be met. Housing that involves the active participation of the community, which accommodates its values, relates to its vernacular traditions while meeting its aspirations. That which retains or remains substantially as the housing of and by the people, is the housing most likely to succeed (Oliver, 2006, p. 408).
This aspect is also emphasized by Salama (2007) who highlights that built forms should be perceived as experienced spaces, spaces which are manifestation of perceived cultural forces. ‘The built environment is variant, diverse, and complex. Buildings and spaces are major components of its environment: planned, designed, analysed, represented, built, lived in and occupied. They are also experienced, perceived, and studied’ (Salama, 2007, p. 112).

Oliver and Salama’s argument is shared by architects Richard Rogers and David Gumuchdjian (1996) who also argue that architecture, the multi-faceted discipline celebrated by classical theorist Vitruvius, nowadays often ignores its primordial roots which are based on cultural forces. They highlight that cause of this trend, many industrialized nations are experiencing a conflict between the need for rapid development and continuity in respecting their society’s cultural traditions (Rogers & Gumuchdjian, 1996, p. 68).

Rogers and Gumuchdjian (1996) stress that with so much emphasis on standards, regulations, and accountability, along with the pressures inherent in the property market whose final goal is to simply minimize building costs and maximize profit, contemporary practitioners neglect to design architectural and spatial environments responding to the users’ specific needs. As a result, the contemporary trend is that buildings of all types are currently packaged and standardized, then chosen from catalogues, without any allegiance to place and society’s cultural-traditions (1996, p. 68). This view is shared by Aloweid (1991) and Mahgoub (1999). Aloweid highlights how, in Saudi Arabia and the United Arab Emirates, housing construction has lost its usual image in order to fulfill specific standardization requirements. He observes that the increase of western-style housing was culturally inappropriate to Saudi Arabia and the United Arab Emirates. In his article ‘Architecture in the United Arabs Emirates’, Yasser Mahgoub, emphasizes how the development of the built form in the United Arab Emirates is entirely influenced by rapid economic changes without taking into consideration inhabitants or societal cultural-traditional factors. Also, in their exploration on socio-spatial aspects of traditional Souqs in Oman, Al-Maimani, Salama and Fadli argue that Muscat municipality should attempt to preserve and revitalize the Souq Mutrah in Muscat through a more attentive urban heritage conservation effort. ‘Architects and urban designers are an integral component of this development process. They need to play a key role in encouraging local authorities to look into the essence of the architecture of the Souq, its evolution through people actions, and its current realities’ (Al-Maimani, Salama, & Fadli, 2014, p. 64)

Due to the need to create contemporary architectural forms responding to users’ cultural traditions, social researchers and practitioners pointed out the necessity of re-evaluating a theoretical cultural framework in the architectural design of the built form (Rapoport, 1969, 1982a, 1982b, 1997, 2000). This framework is also asserted by Amos Rapoport (1969, p. 5), who undertook extensive research, dating from as early as 1969, on the relationship between built form, culture and cultural traditions, namely in a vernacular and cross-cultural context.

Rapoport’s view is shared by Asquith, Vellinga (2005) and Paul Oliver (1997) who states that despite ‘at the close of the 20th century, it is evident that the majority of the peoples of the world still live, works and worship in vernacular buildings’ (Oliver, p. xxii), the study of vernacular architecture has been neglected in the past half century due to the interest of historians to grand or elite design.

Grand or elite building has always received a measure of attention, if only because historical works were written and read by those who built and inhabited the great houses of the past and important historical decisions were taken in them. But the builders of vernacular houses were in most parts of the world until the recent past very nearly illiterate. They kept few records, and the social classes which stood above them showed little interest in their lives or their lifestyles.
The persistent neglect by formal historians of vernacular architecture is easier to explain than to excuse. The historian has traditionally been concerned with power, its locus within the state and the balance of power between states. The humbler classes have not, except on rare occasions, exercised power (Oliver, 1997, p. 46).

Both Rapoport and Oliver claimed that the interest in the way cultural traditions influence the form of domestic dwellings, the most typically vernacular building type, is frequently ignored by architects, sociologists and multi-disciplinary researchers, who are more interested in studying cultural preferences embedded in built form at a macro scale rather than a micro scale level.

Furthermore, as Rapoport states, the interrelationship of the built form and cultural traditions has not been extensively investigated in a cross-cultural vernacular housing context. In this setting, as Rapoport notes (1982a), vernacular houses built by their users in an alien built environment are referred to as ‘transnational houses’. Consequently, this paper endeavours to bridge the gap between the form of houses and cultural traditions in a specific micro-scale context which is represented by vernacular houses, and to a ‘setting’ which is referred to as transnational houses (Poulsen & Lange, 1998; Rapoport, 1982a). Vernacular architecture has been chosen because it is considered to be more autochthonous, spontaneous and authentic compared to that which is designed in a professional environment. Therefore, its form can be examined as evidence of the way the users influenced it in response to cultural traditions.

In this paper I will use the framework and concepts discussed by Oliver and Rapoport to investigate the way Italian migrants to Australia recreated their memory of vernacular housing in Italy for their new homes in a different country, how and the extent to which cultural traditions influenced the architectural form of Italian migrants’ houses in post WWII Brisbane and the way the memory of Italian design was modified by the customs and practices of Australia.

VERNACULAR AND TRANSNATIONAL HOUSES
In this section I will provide a brief explanation of the type of building which constitutes the topic of investigation. Rapoport defines as vernacular houses (a) those artifacts built by their users within a bounded cultural and/or traditional context and (b) whose architectural forms are determined by cultural traditions learnt by the users through history and then enduring for long periods. His definition highlights the importance of understanding the active role of the (a) users in the construction of the artefact and of (b) cultural traditions as a factor determining the overall form of the vernacular house.

The vernacular house, built by the average member of the group, has certain forms which are taken for granted and strongly resist change, because some societies tend to be very tradition oriented. This justifies the relationship between built forms and culture and, furthermore, the fact that these forms endure for a very long time. In a primitive society the model is uniform being the dwellings all identical (Rapoport, 2000).

Furthermore, as stated above, Rapoport stresses the differences between vernacular and primitive built forms: he states that ‘primitive buildings refers to that produced by societies defined as primitive by anthropologists, while vernacular refers to pre-industrial, modern and present-day design’ (Rapoport, 1969, p. 4). Rapoport points out an aspect which is relevant to the purpose of this study: the process of construction which characterizes and differentiates primitive from vernacular architecture: while any member of the group has all the available technical knowledge to build a primitive building, in a vernacular context owners/users employ tradesmen for the construction of the building while also being participants in the design/construction process.

This definition is shared by other scholars who state that the term ‘vernacular architecture’ represents all buildings designed and built by their users within a bounded cultural and traditional context, in opposition to building exemplars created by formally trained architects (Al-Maimani et al., 2014; Oliver, 2006, p. 143; Smith, 2014; Tilley, Keane, Kuchler, Rowlands, & Spyder, 2006, p.
Moreover, Oliver highlights that vernacular architecture is the reflection of two components, material and cultural, of its builders and occupiers. Oliver argues that all cultures have distinctive and unique vernacular architecture traditions that are shaped by specific needs dictated by a way of life.

In his following definition Oliver highlights that vernacular architecture, developed to meet the occupiers’ specific cultural needs, embodies community values and reflects both the material and cultural view of its builders and occupiers.

Vernacular architecture comprises the dwellings and all other buildings of the people. Related to their environmental contexts and available resources, they are customarily owner- or community-built, utilizing traditional technologies. All forms of vernacular architecture are built to meet specific needs, accommodating the values, economies and ways of living of the cultures that produce them (Oliver, 1997, p. xxiii). To which it could be added that ‘they may be adapted and developed over time as needs and circumstances change’ (Oliver, 2007, p. 14).

Oliver argues that if architecture can be defined as a language form, vernacular architecture can be defined as ‘the architecture language of the people’ with its ethnic, regional and local dialects (Oliver, 2006, p. 17).

Finally, Rapoport and Oliver argue that history has shown how building forms cannot be understood merely by reference to climatic conditions, availability of materials, technology and biological needs. Critically, in their view materials and construction techniques can facilitate and make possible certain decisions about the form but they cannot determine or provide fully an explanation of the nature and diversity of the form to be built. It is the subtle influence of cultural forces that may affect the way people behave, and consequently the houses and settlements in which users live and the way users use them (Oliver, 2006, p. 143; 1969, p. 85; 1982a). They conclude that physical factors are treated as modifying factors rather than determinants of the form, because they do not decide what has to be built, the ways and the reasons. In their view it is the cultural concept of the house, shaped by an accepted way of doing things, acting as a factor determining the form.

The relation between the form of vernacular houses and tradition, as an accepted way of doing things, is also emphasized by Oliver who stresses that vernacular architecture is usually developed where there is a strong tradition and a supportive environment (Oliver, 1997).

Tradition and transmission consider the means by which traditions in vernacular architecture are passed on, or ‘handed down’ from one generation to another. Some of these are verbal, others require the training of bodily memory, but all are subject to the values and norms of the culture (Oliver, 1997, p. 70).

‘Traditionally, the sensitivity and the know-how, the skills and the competence to build affectively in response the land, the climate and the resources to land, have been passed on between generations’ (Oliver, 2007, p. 16).

The determinant role of cultural traditions shaping the built form is also highlighted by scholars such as Erdogan, Erkis and Smith in their analysis of the form of traditional houses located in the Sille settlement.

‘Traditional house architecture and its traditional fabric constitute a live museum, which reflects history, culture, life-style and world views of a society’ (Erdogan & Erkis, 2014, p. 117).

‘Housing in the two largest cities of ancient Mesoamerica -Teotihuacan and Tenochtitlan- illustrates the role of cultural tradition in shaping urban house form’ (Smith, 2014, p. 217)

Rapoport emphasizes the relationship between vernacular houses and variables of culture such as cultural traditions, in a context where those who create the built form have a common cultural framework with those who occupy and use the built form. This suggests that Rapoport’s theory,
applicable to a vernacular architectural context, where the resultant built forms are designed and built by the users of the built form who share a particular cultural frame, can also be applied when a migrating cultural group is involved in the creation of its own living environment while cohabiting under a different dominant framework (Miller, 1994, p. 321). As a result, Rapoport defines vernacular houses built by migrants’ in a host country as transnational houses. He also highlights that trans-national houses, representing the location of most of the interaction of the members of migrant-families, adopt or change local vernacular built forms to accommodate migrants’ needs and to respond to migrants’ cultural frame. Therefore, as Rapoport stresses, the form of trans-national houses can also be considered a physical manifestation of the culture of the users (Rapoport, 2000, p. 129).

MEANINGS EMBEDDED IN THE ARCHITECTURAL FORM OF TRANSNATIONAL HOUSES

In relation to the interpretation of the architectural form of transnational houses, in particular of the façade, for instance, Jacobs (2006, p. 180) is concerned with the relationship between migrants’ past and current architectural form houses. This aspect is also highlighted by Erdogan and Erkis in their analysis of the faced of traditional houses located in the Sille settlement. ‘The most distinguishing features of urban identities are houses and facades. Houses are not simply constructed within the framework of certain architectural rules. Rather, they are designed in accordance with the user needs and they are indicators of customs and traditions narrating culture of life’ (Erdogan & Erkis, 2014, p. 119).

Through an analysis of architectural features within the current migrants’ house, Jacobs shows how migrants attempt to emulate decorative elements present in their past houses with the purpose to feel at home in their new constructions and in the host country built environment. Moreover, in her study focusing on Italian migrants houses’ architectural style, Baldassar (2002, pp. 84-85) highlights that Italians migrating from Treviso (San Fior) to Western Australia built the façade of their houses in Perth in the architectural style of houses built in Treviso, and therefore influenced by (1) architectural elements learnt in their native country. Borgo and Boyd showed that Italian migrants in Carlton, Melbourne, built their own houses in an 'Italian-style' and they decorated the houses with Italian statues and materials like marbles (Borgo, 2006, p. 2) (Boyd, 1987, p. 51). Apperly, Irving and Reynolds discuss how in the 1960s Italian migrants built their houses with a distinctive style named ‘Victorian Italianate’ (Apperly, Irving, & Reynolds, 1989, pp. 70-73). They state that in the 1950-60s Italian migrants purchased terrace or small Victorian and Edwardian-style cottages in inner suburbs. Afterwards the exterior and interior of these houses were renovated and modernized according to their interpretation of the way an Italian house should look like.

Exterior walls were painted with cheerful colours, porches were repaved with tiles, wrought-iron friezes were removed from the front porch and picket or wrought-iron fences were replaced with rendered concrete or exposed bricks. Columns and posts decorated the exterior, and front porches were decorated with flowers grown in pots. Pergolas were built in backyards which were usually reserved for cultivation of vegetables, grapes and olive plants. Interiors were also transformed from the dark wooden Victorian style to become light-filled and minimalist. Wooden floors were replaced with tiles or linoleum, aluminium window frames replaced timber sash windows and windows were protected with roller-shutters that were unfamiliar to local homes at that time (Azriel, 2010).

Willingham states that by the renovation of their houses in Melbourne, Italian migrants followed a ‘Mediterranean Idiom’. In the quote below, he provides a description of the ‘Mediterranean Idiom’.

The Mediterranean idiom or sub-style in housing in Melbourne is characterised firstly by the heavily modified facades of suburban housing in the inner suburbs, and then by the grandiose

Apperly, Irving and Reynolds also explained that in the late 1970s and early 1980s Italian migrants built their houses with the idea to express their success in a new country and also to show architectural elements they learnt from their native country. This style is defined as ‘Nostalgic’ (Apperly et al., 1989, pp. 270-271). A detailed portrayal of this house is explained in his quote: ‘[It] was two-storied and symmetrical, with central external stair and verandah edged with bulbous Baroque balusters of precast concrete. The front elevation featured walls of buff or brown face brickwork pierced by large arched openings.’

Consequently, I argue that the architectural form of transnational houses can be interpreted in relation to previous housing experience, or as a manifestation of memory shaped through a nostalgia practice. In relation to this study, this suggests the importance to investigate the extent to which the architectural form of transnational houses was influenced by traditional architectural elements learnt by migrants through previous housing experience both in their native and host country.

Chapman (2005, pp. 18-57) emphasizes how historic evidence suggests that the human species developed with a materialistic-physical orientation: people share the need for a material world – physical, tangible objects – which provides a means for people of engaging with the world on both rational and emotional levels. In this regard, Chapman refers to the numerous findings of archaeologists indicative of the prehistoric origins of material culture, such as cave paintings, tools, body adornment and other material artefacts. Objects are ‘...seen as an embodiment of meaning and it is from this perspective that they have to be designed’. He also states that ‘even earlier versions of our present selves may have developed some form of material culture which have shaped strong emotional attachments to material possessions’ (2005, p. 59). The reference here is to the objects that people purchase, make and use, as these have a symbolic and affective connection to the person’s status. Such objects (1) serve to generate a sense of belonging to a culture that is beyond the need for survival and sustenance, and (2) are also expression of meanings and/or specific needs (Gamble, 2001, p. 101).

Csikszentmihalyi, Rochberg-Halton and Arvidsson (1981, pp. 1-24) share this view of culture: they argue that people make common sense of the world by social interaction and also by interacting with things or objects. They add that when an object has a ‘meaning’ to someone, then it is interpreted in the context of past experience, either consciously or unconsciously in the form of habit. The development of things in a (3) cultural tradition means that people can compare their actions with those of their ancestors. People can share common values and beliefs, or more generally culture, through interaction with objects (Arvidsson, 2006, p. 75).

These are important insights for the study of how a cultural frame extends to the way in which Italian migrants represents itself through the architectural form of their houses. These insights reveal the importance to analyse the architectural form of the house, generally as a sense of (1) belonging to a culture, (2) as expression of meanings or needs, (3) habit and traditions which people share through interaction with past housing experiences.

**METHODOLOGY**

In adopting a ‘qualitative’ methodology, this research study inevitably draws upon multiple qualitative research methods (Creswell, 2003, p. 181). One of the most significant aspects of case-study strategy is that varied methods are employed and combined, or triangulated, with the objective of exploring a case from different perspectives in order to ensure the validity of the case-study research (Denzin, 1978). This process, defined by Johansson as triangulation, or ‘the combination of different levels of techniques, methods, strategies, or theories, is the essence of case-study strategy’ (Johansson, 2003, p. 8). Therefore, to validate the findings within the current
study, ‘triangulation’ from different sources (Yin, 2003, p. 159) is adopted. The methods employed in the research study enable the researcher to collect (1) oral data, through digitally recorded focus groups and in-depth interviews, and (2) visual data through photo elicitation, site visits, field observations and visual materials including drawings and photographs (Creswell, 2003). An integration of methods collecting both oral and visual data is considered essential for the purpose of this research study. The diagram below (See figure 1) explains the research method format.

![Diagram of research method format](image)

**Figure 1. The research method format (Source: Author)**

**Data collection**
The process of data collection started with the selection of Italian migrants, followed by the selection of the artifacts. The persons and the artifacts were selected according to specific criteria or limits. Interviewees were limited to migrants born in the south of Italy, given insight into Italy’s cultural-traditional, regional and climatic differences, during the 1930s and 1940s. All selected first-generation migrants had migrated to Australia in the 1950s and 1960s, that is, after WWII reconstruction in Italy. As all interviewees were approximately 20-30 years old at the time of their arrival in Australia, I assume that people who lived in their homeland for several years and migrated as young adults were preferable because they had spent enough time in Italy to assimilate traditions belonging to a cultural group. Additionally, social class is a ‘limit’ that must also be taken into account. Pierre Bourdieu (1992) argues that domestic behavior and cultural priorities differ according to the social class people belong to. Those selected for interview can be broadly classified as working class people: they constituted the majority of Italian immigrants migrating to Australia in the post-World War II period (Cresciani, 1985, p. 95). Accounting for the limits listed above, the case study included 20 Italian migrant couples and four self-built houses which preserved their originality (Erdogan & Erkis, 2014, p. 130). The oral and visual data were concurrently collected at different stages.

**Nature of questionnaire**
The hour-long interviews with the twenty couples were recorded electronically, and later thematically analysed and partly transcribed in Italian. Participants were encouraged to bring to the interview any existing photographic material that they deemed relevant that they were willing to share. At the commencement of the in-depth interview, participants talked about any photographs they brought with them. The photo-elicitation interview provided a model for collaborative research, where the interviewer would become a listener as the participants...
interpreted the images for the interviewer. This method served as an ice-breaker activity to help to create a comfortable space for discussion. The interviews began with a number of generic questions directed at the respondent’s personal story about migrating to Australia, about their relationship with the neighbourhood, community, the city and their initial experience in Australia. The interviewees were then asked to provide a description of the homes in which they had lived in Italy and since their arrival in Australia. These included questions about the homes’ atmosphere, and physical characteristics.

In-depth interviews with the four couples, who were chosen as cases, each of whom owned a house, took place in the participants’ house and sometimes involved other family members. The interviews took around two hours on average, were digitally recorded and then were partially transcribed. Interviews were open-ended and were allowed to take the conversation to different facets of their migration experience, to tell their stories of their housing experiences, to describe their previous houses in Italy and in Australia, to draw sketches, plans and elevations of houses, and show photographs of their former houses in Italy and in Australia.

Interpretations of oral and visual data
The interpretation of personal narratives of Italians’ stories gathered during the interviews was based on discourse analysis, since this method of interpreting the meaning of language, texts and visual representations, is able to ‘move beyond the text, the subtext, and representation, to uncover issues of power relationships that inform what people think and do’ (Waitt, 2005, p. 165).

As highlighted by Azriel (2010, p. 51) the discourse is influenced by the work of the French philosopher Michel Foucault who conceived discourse within a theoretically informed framework exploring ‘the rules about the production of knowledge through language (meaning) and its influence over what we do’ (Waitt, 2005, p. 164).

It is also crucial to highlight the fact that the interviews were conducted in only one language, Italian. All participants delivered their stories in this language, their mother-tongue, expressing their thoughts, opinions and feelings. Having this shared native language allowed me to gain a better understanding of the ideas and feelings surrounding the home than what would have been possible for an interviewer conducting the same study in a non-native language (Vygotsky, 1978). While the exact words participants used were translated into English, the ideas and concepts conveyed originally in Italian allowed these translations to reflect a much richer understanding of the ways migrants view their homes and relate to them.

The analysis of the visual data followed the same approach as that applied to the oral data, in that it employed discourse analysis as the primary analytical tool. The aim was to analyze and interpret the visual data in a consistent manner, because visual data provided different knowledge about the way participants see the world and understand it.

The photographs taken during the site visits were used to document the interviewees’ houses and to provide an important point of reference in a study that considers both the intangible ideas put forward by interviewees and the physical manifestation of these ideas when translated to the architectural features of their houses.

‘In façade analysis of these houses, architectural façade elements are studied and prevalent characteristic features are identified’ (Erdogan & Erkis, 2014, p. 123)

Visual material helped in better understanding the role of cultural traditions as determining factors in shaping the architectural form of Italian migrants’ houses.

FINDINGS
As already mentioned, for this study the architectural form of houses built by Italian migrants refers only to the elements characterizing the architecture of their houses: its (1) structure, (2) materials and construction techniques and (3) the decorative features visible on the main facade.
These are the categories of the house which were analyzed. The findings summarized below will follow the categories listed above. An attempt will be made to discuss those architectural elements in Italian houses that appear to be typical and that must be explained as expression of cultural traditions, differing from other architectural creations. And a suggestion will be made where these elements were changed, to indicate the influence of Australian architectural elements.

**The structure**

Italian migrants pointed out that, despite the most common and spread out single storey house in Brisbane, they opted for building a spacious two storey house. Italian migrants stated that this choice was influenced by two main factors: this type of building would have allowed the users to have more space to be utilized for (a) performing specific daily activities and it would have recalled (b) the tradition of the extended family grand house in Italy (See figure 2). The large house built by migrants was the manifestation of their wish to continue in Australia the cultural tradition of the family grand-house, which traditionally was inherited by one of the heirs (See Figures 6-7-8-9).

It does not surprise their revelation that their new house in Australia was meant to represent a sort of legacy for their family and their descendants: their houses were supposed to become the new family-grand house, at least for one of their descendant, as it was in the Italian cultural tradition or as the house they lived in before departing Italy with their extended families.

**Materials and construction technique**

In relation to materials and construction technique employed to build the house, the findings reveal that, despite the fact that most detached houses in Brisbane were built up to the 1970s by adopting two different construction systems called (a) 'weatherboard' and (b) 'brick veneer walls', Italian migrants wanted a house constructed by using a construction system called (c) 'brick cavity wall', which, as reported by the interviewees, was a technique not commonly used in the construction of dwellings in Brisbane. More specifically, the weatherboard wall consisted of the outside 20 mm thick horizontal weatherboard cladding, 100 mm air space housing the timber framing and the internal 12 mm thick plasterboard rendered and painted finish. The external timber boards were usually painted (See Figures 10-11). A brick cavity wall consists of two walls of 110mm thick extruded bricks separated by a 50mm air space. The difference between a brick veneer (Figures 12-13) and a cavity brick wall one (See Figures 14-15) is mainly in the internal wall: while in both techniques the external wall is built in bricks, the brick veneer wall has an
internal layer consisting of a timber stud wall, while the cavity brick wall has an internal brick layer. Italian migrants and builders replaced the typical internal structural timber wall with a brick wall. Furthermore, in the case of the brick veneer wall system, the light timber slab and trussed roof are supported by the internal timber stud frame. In the case of cavity brick wall system, the internal brick wall layer supports all structural loads represented by the concrete slab and the timber trussed roof.

All interviewees stressed that the distinctive ‘cavity brick’ construction technique was chosen for traditional reasons, namely because Italian migrants in Brisbane were acquainted with this construction technique commonly used in Italy. Interviewees pointed out that the houses they resided in Italy before departing were traditionally constructed with the cavity brick construction system by their ancestors. Italian migrants also stressed that while in Australia some of them resided in ‘weatherboard’ and others in ‘brick veneer wall’ houses, all of them chose to build a ‘brick cavity wall’ house as a manifestation of physical stability, solidity, durability and thermal insulation. Therefore, cultural traditions, memory and migrants’ housing experience, both in the homeland and in the host land, prior to construction of their present houses, influenced the way Italian migrants built their own houses in Brisbane (See figure 3).

The analysis of materials and construction techniques has shown that when cultural patterns become established, there is generally a propensity to conserve them; most of the time individuals are deeply committed to their own customs. Firstly, this has been proved by the Italian migrants in Brisbane: they chose to employ the cavity brick wall system to erect the outside walls of their houses and to cast a concrete slab as a floor, as influenced by cultural tradition, or an accepted ways of doing things, memory from Italy and prestige value.

The façade decorative features

The last chosen category related to the architectural form of the house is the façade. As also envisioned by Erdogan and Erkis, ‘Materials, construction technique and technology used in the traditional houses are important effects shaping the façade. Easy material, master recruitment and climate characteristics are considered in the building construction stage’ (Erdogan & Erkis, 2014, p. 125). The material utilized to build the external walls of the house, the bricks, dictated the most common external decorative feature visible on all the façades: the face brick finish (See Figures 6-7-8-9). Italian migrants revealed that this was not a feature visible in the houses they
lived in Italy before migrating to Australia, since Italian houses in Italy built by cavity brick walls were usually rendered and painted. Therefore, in this case they were not influenced by cultural traditions assimilated in Italy. On the other hand, they revealed that they were influenced by residing in Australia in ‘brick veneer’ houses where the external wall was always a face brick finish (See Figures 6-7-8-9). This wall did not require to be plastered and/or painted as it occurred in Italy, and consequently it was maintenance free.

Other features highlighted by respondents and quite evident on all the main façade of Italian migrants’ houses investigated are the porch and the balcony, the brick round arches, the balustrade located on the balcony at the first floor, differentiated in stainless steel pattern or solid white concrete columns, and the Roman pillars supporting the overhanging slab on which the balustrade sits (See Figures 6-7-8-9). The first architectural element, the porch and the balcony were not recognized as elements visible in previous Italian houses: the extended family grand house presented a parallelepiped shape with no projecting volumes. On the other hand these two architectural elements were influenced by forms visible in Australian houses. The other features listed above were all influenced by architectural traditions learnt in Italy. Interviewees explicitly pointed out the reasons for having these features on the main facade: although they decided to build their houses within the Australian host built environment, they still wanted to maintain an ‘Italian flavour’ on the main facade through the use of architectural elements, which, in their view, are recurrent on the façade of many residential buildings in Italy (See figure 4). By utilizing traditional architectural elements visible in the built form in their native country, they wanted to create a façade reminding them of their origins. This was also proved by the fact that Italian builders, craftsmen and the owners of the house in Brisbane did not have access to any formal architectural drawings of houses built in Italy – plans, section and/or elevations – and in the end the design of the façade of their houses arose from traditions in their efforts to simulate through memory an Italian architectural design in Australia.

This confirmed the theories of Baldassar (2002, pp. 84-85) about traditional architectural elements used in their native country being the primary factor in influencing the façade of the transnational house. Besides, in reference to Rapoport’s definition of the features characterising vernacular houses, the findings confirmed that Italian migrants worked within an idiom which they varied according to their taste. However, the lack of an aesthetical pretension, which in Rapoport’s view is one of the features of a vernacular house, cannot be confirmed through this study. Italian migrants tried to express aesthetical pretension through the use of decorative architectural elements which reminded them of their traditional architectural origins.
In addition, as pointed out earlier, distinctive features of Italian houses, represented by the porch and the balcony, were according to migrants’ perspective architectural elements influenced by local architectural forms, commonly visible in Australian houses. This confirm Rapoport’s view who stresses that trans-national housing is interpreted as a mix between the culture deriving from the native country and the one assimilated in the host nation.

CONCLUSIONS
At my arrival in Australia I observed the architecture of those houses built by the Italian migrants in Brisbane, but I lacked the understanding of the culture of those for whom these buildings were constructed.

The architecture of Italian migrants in Brisbane is not just about structural face brick walls and decorative round arches. The form of Italian houses in Brisbane shows more than a collection of decorative architectural elements: it is the manifestation of traditions as expression of culture of the people for whom it is built; it expresses the history of these people and of their journey, from Italy to Australia.

The findings for this research study (See figure 5) showed that the architectural form of Italian migrants’ houses, namely the structure, the materials and construction technique, the decorative elements visible on the façade, were influenced by (a) cultural traditions assimilated through past housing experiences in Italy and by (b) the exposure to local architectural forms, commonly visible in Australian houses.

Two conclusions might be drawn: neither tradition was ever entirely transformed; it continued to survive with only minor alterations. The architectural form as such remains, in cultural terms, a foreign element within the Australian architecture.

Finally, this study can also help in translating these research findings into practice. First, in order to support a humanistic approach, the architectural design of houses should be based upon two aims: primarily to investigate the extent to which house design can be guided by the users’
cultural traditions; and, secondly, to investigate possible avenues of creative alternative designs for housing based on cultural traditions.

Therefore, an involvement of residents and an evaluation of responses to forms of habitation from users within a given society can improve future planning and it can progress housing process design. Such participation would enable the users to express their cultural needs and would facilitate a spontaneous, dynamic change. The culture, architectural traditions and way of life of inhabitants cannot be expressed if the environment is built through an imposed formula dictated by standardization, speculation and profit purposes. People can have a deciding role in the creation of their built form: they can put a visible imprint on it. The architectural form of houses built by Italian migrants is the manifestation of a sympathetic approach to cultural identity and its defence, in the face of off-the-shelf house design and the lack of identity that this brings.

‘The main goal of conserving historical fabric and identity is to preserve an reclaim cultural heritage and to transmit them to future generations’ (Erdogan & Erkis, 2014, p. 134).

Italian migrants influenced the built form of the host Australian built environment and culture, in the form of traditions, is currently embedded in the built environment of Australia. As highlighted by Erdogan and Erkis, it is hoped that such tangible cultural heritage, which represents the national cultural heritage of Australia, is protected and transmitted to the following generations.

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Appendix A: Visual Material

Figure 6 (Case 1). The house was built by Lina and Vittorio. The main façade is characterized by a hand made concrete balustrade and Roman columns supporting the concrete slab on the front porch (photo by the author, 2012)
Figure 7 (Case 2). House built in 1982 by Maria and Salvatore. The main façade is characterized by a steel balustrade, brick columns supporting the concrete slab on the front porch and round arches on the balcony (photo by the author, 2012)

Figure 8 (Case 3). House built in 1983 by Flavia and Aldo. The main façade is characterized by a steel balustrade, brick columns supporting the concrete slab on the front porch and round arches on the balcony (photo by the author, 2012)
Figure 9 (Case 4). House built in 1984 by Pina and Carmelo. The main façade is characterized by a hand made concrete balustrade and brick columns supporting the concrete slab on the front porch and elliptical arches on the balcony (photo by the author, 2012)

Figure 10. Schematic section of weatherboard wall (drawing by the author, 2012)
Figure 11. Schematic axonometric view of weatherboard wall (drawing by the author, 2012)

Figure 12. Schematic section of brick veneer wall (drawing by the author, 2012)
Figure 13. Schematic axonometric view of brick veneer wall (drawing by the author, 2012)

Figure 14. Schematic section of cavity brick wall (drawing by the author, 2012)
Figure 15. Schematic axonometric view of cavity brick wall (drawing by the author, 2012)

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FLEXIBLE HOUSING: THE ROLE OF SPATIAL ORGANIZATION IN ACHIEVING FUNCTIONAL EFFICIENCY

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Abstract
According to inhabitants' dimensions and various aspects of human life, flexible spaces are used as a solution in social housing due to the lack of space that architects always confront. In fact, flexible housing responds to inhabitants' needs throughout time. In other words, it evolves from the change in residents' requirements and promises adaptability to their living conditions. This spatial adaptability replaces spatial hierarchy and enhances life quality. The main purpose of spatial organization is to plan an interior space in order to create functional efficiency in a dwelling layout. This study attempts to research less-focused concepts so as to establish guidelines for future flexible housing design. Encompassing two case studies regarding Dutch housing, this study aims to understand how interrelated space planning enhances spatial arrangements to achieve an efficient spatial configuration. Spatial organization is delved with in depth to understand how functional efficiency can be achieved in flexible housing. Finally, interrelated spatial organization is believed to contribute to placing spaces according to their function by creating a multilateral relationship that responds to the inhabitants’ ever-changing needs.

Keywords: flexible housing; functional efficiency; spatial organization; flexibility.

INTRODUCTION
Residential housing was the first form of architecture that people built for themselves. The primary structural behaviour of the first communities was nomadic or semi-nomadic and their settlements were temporary and movable. Once the first cores of the cities arise, the construction of housing as buildings began; later on, nevertheless, their basic characteristics changed only in inessential features (Förster, 2006). In fact the dwelling as a settlement, throughout the history of humanity, has been the basis of indigenous societies and cultural development. Housing is always influenced by living habits, cultural boundaries and environmental conditions. A house is designed based on the combination of comfort and safety and also a sense of belonging to a dwelling space (Mohamad Mahdi Shabani, Tahir, Shabankareh, Arjmandi & Mazaheri, 2011).

Nowadays, architects not only focus on designing the facade composition and the geometry of the floor plan; they also take into consideration subjects such as the organization within and around the dwelling, the private and public space, the importance of spatial function and domestic structure, the gendered character of interior and exterior spaces, the influence of consumption patterns regarding spaces and decoration, the ways in which space is organized and many other aspects of the occupants’ experiences (Lane, 2007). The main concern with respect to the conditions of the industrial cities was the low standards endured by many urban residences. All of the members of a family would usually inhabit a single room and share unsuitable bathrooms and kitchens with many other people. Even in the early philanthropic houses, where their undertaking and standards were generally good, kitchens and bathrooms were commonly shared. The main purpose of dwelling renovation in the twentieth century is to move from this situation and reach good space standards in housing design (Towers, 2005).
LITERATURE REVIEW

"The prognosis for proponents of modernist design and process was to generate flexibility in the design process. Hill (2003: 32) suggests that flexibility has many meaning nuances, but that it originally refers to the accommodation of changing relationships between events, contexts, and the use of space. The most common meaning of it is flexibility by technical means, which, as Forty (2000) states, can be understood in relation to a couple of types. The first one is flexibility by movement or the reconfiguration of the dwelling’s intricate elements. The second type of technical flexibility refers to the use of lightweight demountable fixtures and fittings, and movable floors, walls and ceiling panels, including open-plan design. Flexibility by means of moveable parts and/or open plan is, for Hill (2003), as much a description of use as it is of form, and it is characterized by a versatile combination between space and use. The flexibility of a space depends in part on the user, or, as Hill (2003:38) suggests, the change of use may well be less dependent on a physical transformation of the space than a change in the perception of the user" (Imrie, 2006).

The concept of flexibility in the context of architectural housing is introduced under two topics: "the evolving conditions of the vernacular" and the "external pressures that have prompted housing designers and providers to develop alternative design solutions, including flexible housing" (Schneider & Till, 2007). According to this, it can be claimed that flexibility in domestic architecture either evolves and improves from the experience of traditional tendencies in housing design or appears as a new design tendency which follows the outward forces of the twentieth century (Albostan, 2009). For example, the main idea of spatial configuration employed in traditional Malay housing is associated with social and cultural patterns, and religious values. The most prominent feature of these houses is their spatial flexibility. The open plan with minimum physical boundaries offers flexibility to the space (Abdul Rahim & Abu Hassan, 2012). Additionally, flexibility is a feature of traditional courtyard housing which is an epitome of introverted structures in Iran (Nosratpour, 2012). In fact, creating different types of space for different functions implies that these houses intend to fulfil family requirements according to their lifestyle throughout time (Arjmandi, Tahir, Che-Ani, Abdullah, & Usman, 2010).

In fact, flexibility as a solution, in today’s social housing, is an issue that has been considered on different levels throughout time in eastern architecture. In Japanese traditional architecture, sliding doors have the finality of separating spaces as well as changing the dimensions of these in the house. As a result, multi-functional spaces are created by opening them up. (Shabani, Tahir, Arjmandi, Abdullah & Usman, 2010).

For instance, in the rural house designed by Kazuhiko and Kaoru Obayashi in Osaka bay, "The actual flexibility and adaptability of the dwelling is completely dependent on the active participation of its users (as well as a specific type of furniture): by pulling out futons from a storage cupboard, a room that is used as a dining or sitting room can be transformed into a bedroom; the minimal use of furniture and the relative lack of untidiness demands discipline in order to achieve flexibility, which may be beyond normal living patterns, but nonetheless the principle remains. Flexibility is also enabled by means of a modular approach to design. The size of the rooms is based on the standard dimension of tatami mats; the house has rooms made up of a set of these mats. The openness of the plan as well as the frame construction suggest that functional and social changes can be dealt with easily - both on a daily basis as well as on a periodic or even longer term. Connections between rooms can be undertaken by opening or closing sliding screens, which can change the size and function of a space in a matter of seconds: two individual rooms can be united by simply opening up two large screens so that a couple of small spaces become one large room that can be used either for a specific festivity or for a family gathering" (Figure 1) (Schneider & Till, 2007).
Designing Flexible floor plans has been experimented since 1920. Particularly the Netherlands has a long and ongoing tradition to which great architects such as Rietveld, Stam, Van Doesburg, Van den Broek, Van Tijen, Habraken, Hertzberger and Van Eyck, and also the most recent generations, have made their innovative contributions. However, the spirit of flexibility appeared to flow throughout Europe in this century and the Netherlands was the country where this subject was systematically integrated in the construction development of social housing and where it has never completely disappeared from sight since then (Van Eldonk & Fassbinder, 1990).

RESEARCH METHODOLOGY
The manner in which interrelated space planning enhances spatial arrangements in order to achieve an efficient spatial configuration will be corroborated in this article. The main goal of this paper is to develop functional efficiency by means of improving spatial organization in flexible housing. This approach helps achieve adaptability between domestic space and life, and ultimately enhances the quality of life. The evaluation method is based on floor plan analysis encompassing two case studies of Dutch modern social housing; the Vroesenlaan apartment blocks designed by the Dutch architect J.H. van den Broek in the Blijdorp neighbourhood of Rotterdam (1934-35) and the Bergpolder apartment building designed by the Dutch architect Willem van Tijen in the north of Rotterdam (1933-34).

STATE OF THE MATTER
"At a basic level the case of flexible housing is a straightforward matter of common sense. Why, to put it simply, would one not design in terms of flexibility and adaptability? Housing is volatile, - subject to a whole range of cyclic, non-cyclic and tendency changes-, and if it is not able to respond to these changes it becomes at best unsatisfactory, at worst obsolescent. Yet, despite
the fact that a dwelling is inevitably dynamic, it is often framed intellectually and physically as something immobile. In fact, one of the problems of treating housing as if it were a static commodity with rigid design parameters is that it reaches a world of changing demographics. A mix of units that meet immediate demand might well be inappropriate in thirty, let alone one hundred, years’ time. Thus, over the past twenty years there has been a decrease in the number of traditional family units, a higher proportion of elderly people, an increase in the number of single-person households, a rise in the demand for shared accommodation and a growing move towards home-working. Statistical data shows that these tendencies will probably continue into the next decades, though they will be overlapped by as yet unseen and uncertain demographic developments. Probably the only thing that one can state with any certainty is that the needs of housing at the end of the twenty-first century will be different to the requirements and desires today; the necessity for housing that can adapt to these changing demographics becomes compelling. Changing demographics require new architectural solutions that incorporate flexibility into emergent types of housing. "Housing should also respond to the internal changes occurring during the lifetime of its inhabitants. These internal micro-changes come at a housing unit level. If it cannot adapt then the inhabitants will have to move home, which is both financially and socially disruptive. Housing has to be flexible enough to deal with two conditions. Firstly, the necessity to adapt to the changing needs of individuals as they grow old or become less physically capable. Secondly, a dwelling that can respond to the changing constitution of a family as it grows and then later on contracts (Schneider & Till, 2007).

Nowadays, as in the past, we build or change houses in order to respond to our requirements beyond it being a basic refuge. In turn, due to the fact that dwellings are a physical space, they impose limitations on their inhabitants and at the same time create opportunities for them (Ward, 1999). The evolution of the private habitat is an intrinsic feature of human beings. Housing is the means where inhabitants have the most environmental intervention power because it is the first factor of relationship with the environment. It is the place where inhabitants and their needs are encountered. Any alteration, change, creation or modification is an attempt to reach the sense of belonging to a place. A home is a place where family life occurs, as a series of changing or permanent conflicts. The heterogeneity of living life makes each house a customizable, unique and unrepeatable place (Valenzuela, 2004).

Architects now pay considerable attention to the users of residential units whose creative motivations have an influence on their homes. According to past experiences which have seldom been recognized, the inhabitants of a dwelling, including the owner or the family group who resides there, shape their homes. Sometimes they design and build them by themselves. At times they design them, and employ a carpenter, builder or architect. From time to time they influence the design by choosing out of a series of patterns. Nevertheless, inhabitants always modify and remake their home spaces by rebuilding, decorating, furnishing, remodelling, landscaping or simply by dwelling within the forms and spaces of domestic architecture. Therefore, the places where people inhabit are comprehended as a space in which to illustrate the ideas of family, individuality, lifestyle, privacy and socio-cultural patterns; to create, in other words, the general cultural patterns of an era (Lane, 2007).

Spatial organization influences the way in which family members find themselves inside a dwelling or within a building. The distribution and arrangement of space is a building aim and not just its physical objective. Put another way, buildings are not just objects, but transformations of space by means of objects. As a consequence, configuration is a fundamental relationship between form and space, which is appropriated in the processes, by which buildings are transformed from physical objects into social and cultural objects. In both senses, society acquires a definite and recognizable spatial order (Abdul Rahim & Abu Hassan, 2012). "…Market research in the Netherlands has shown that people are more likely to stay in their homes if they can adapt them, and by a corollary high percentage want to move because they cannot adjust their dwellings to their needs" (Danko, 2013). Therefore, applying users’ ideas
in the planning and designing processes of the dwelling is a way to find out the relation between people’s expected needs and their upcoming ones. This enhances the adaptability of the dwelling to the needs of its occupants and consequently their satisfaction. Providing adaptability and flexibility to dwelling spaces according to different lifestyles is a feature of the ideal home (Abbaszadeh, Kalani Moghadam & Saadatian, 2013).

Frank Bijdendijk, Director of the Amsterdam Housing Corporation, argues that without the love and pride of its inhabitants, a building is not assured a long life even when the flexibility requirement is met. To gain its users’ love, a building need not necessarily meet standards which are popular among architects. However, it need not be in conflict with them either. "The meaning of what an architecture loved by its inhabitants is, is no doubt debatable, but the requirement needed unmistakably connects architecture to the quality of the everyday environment" (John Habraken, 2008).

Furthermore, "Flexible housing directly addresses issues of social and economic sustainability. Social aspects are not only sufficed by the user’s involvement, but also by the capacity of flexible housing to accept demographic change and thus stabilise communities. The economic aspects are addressed by means of the long-term vision that flexible housing engenders through future-proofing and avoiding obsolescence. The beauty of flexible housing is that if one follows through its principles and combines them with a response to climate change, one almost inevitably reaches a sustainable solution that integrates the complete range of sustainable issues; however, the green rhetoric is a quiet one that eschews the superficial gestures of some types of sustainable architecture. Flexible housing potentially exceeds the accepted definition of sustainability — providing for the needs of the present without compromising the ability of future generations to meet their own needs — in as much as it is not about avoiding future compromise but encouraging the coming change" (Schneider & Till, 2007).

Flexible housing is aimed to conceive appropriate spaces for inhabitants with diverse lifestyles. In this manner, the ability to respond to users' demands, starting from the very beginning of the dwelling’s occupation and lasting over time, can be considered as the main objective of flexibility in the context of domestic architecture. In other words, flexibility creates adaptable residential spaces according to the requirements of inhabitants with different lifestyles. Flexibility and adaptability, in this sense, are closely associated (Albostan, 2009). The primary intended scope of flexibility in domestic architecture is the creation of a building that can remain in use longer due to being able to satisfy current requirements rather than being used under an external drive. The advantages of flexibility include the capability to fulfil its objective in an ameliorated way by accommodating the occupant’s intervention, accepting new technology and being more economically and ecologically viable. Accordingly, these buildings can respond to these alterations by adapting their use or function (Geehee Yu, 2011).

THE PURPOSE OF FLEXIBLE HOUSING

Flexible housing is identified as a planning choice in the design phase of domestic architecture; either both in terms of construction and social use, or designed for change over its lifetime. The degree of flexibility is highlighted in two ways. First of all the in-built opportunity for adaptability, defined as enabling different social uses, and second the opportunity for flexibility, defined as enabling different physical arrangements. The incorporation of flexibility into the design allows architects the illusion of designing their control over the building in the future, beyond the period of their actual responsibility for it (Schneider & Till, 2005).

In fact, flexible housing is a layout that can be adapted to inhabitants’ requirements and will lead to carrying out their expectations and demands with their own collaboration. Inhabitants’ collaboration in this process will finally result in increasing the general satisfaction of the users (Zandiyyeh, Mehdi; Eghbali, Seyed rahman; Hesari, 2012). In general, a flexible house is a dwelling layout that can adapt to changing requirements and patterns, both social and technical issues. These changing demands may be technological (e.g. the updating of old services),
practical (e.g. the onset of old age) or personal (e.g. an expanding family). The changing patterns might be demographic, environmental or economic ones. Hence, flexible housing undertakes all of the housing development process. In fact, flexibility in domestic architecture allows its’ inhabitants to take part in the design process of the different possibilities of using their living space. Therefore, inhabitants have the opportunity to carry out adaptations to their home spaces (Schneider & Till, 2007).

Flexibility, as a helpful and effective method, has been utilized in different architecture spaces to reach functional efficiency. It has a comprehensive function in architecture that can be defined by open plans and sections, and by portable and changeable elements or furniture. Flexibility as an initial solution, in today’s modern social housing, is a subject that has been employed in different levels throughout different time periods. The Dutch architect, Herman Hertzberger, said that when flexibility became the catchword, it was the panacea to cure all of the illnesses of architecture (M M Shabani et al., 2010).

**CASE STUDY 1: VROESENLAAN HOUSING COMPLEX**
The Vroesenlaan apartment blocks, designed by the Dutch architect J.H. van den Broek and built by the housing association De Eendracht in the Blijdorp neighbourhood of Rotterdam, have become a symbol of modern architecture (Komossa, 2005). J.H. van den Broek was one of the protagonists and forerunners of flexible design. He stated that by means of a more efficient spatial arrangement of the floor plan and by integrating folding beds and sliding walls, the housing dwelling typology could become smaller without losing comfort (Schneider & Till, 2007).

In this housing complex, three characteristics of modern architecture have been incorporated: 1) An open block structure, in which one head end of the block is eliminated and the corners are opened up. 2) A modern spatial hierarchy that organizes the floor plan in order to achieve day and night use. 3) A facade design which was revolutionary for its time, with large glass areas and a concrete skeleton with yellow brick filling the open spaces. When designing these housing blocks, the architect replaced the closed urban block for three wings, arranged around a courtyard which is like an ornamental garden. The corners are open, omitting in this manner the corner flats with poor sun light. The U shape form created is open towards the direction of Vroesen Park, so that all of the dwellings have a view of Vroesen Park from the rear. The dwellings on the street side are 9.5 meters deep and 7.5 meters wide. All of the apartments have four rooms and the area of each dwelling is about 72 m² (Komossa, 2005). The floor plan was designed to respond to the family’s changing needs. The small corridor, which is close to the entrance in the centre of the floor plan, has three doors. One gives access to the kitchen. The other two doors, which are next to each other and separated by a short stretch of wall between them, give access to a long space. The extended central space that functions as a living / dining and study room can be divided into two rooms of the same size by means of sliding doors (Figure 2). The room next to the kitchen is designated to be a dining and living room and the rest of the area is dedicated to a study room, although these functions may be changed throughout time. The study room can be converted into a bedroom by folding down beds that were incorporated into the design (Figure 3) (Schneider & Till, 2007).
On the other side of this extended space, there is a sequence of sliding doors that separate the living and dining room from a small room, one door, a short stretch of wall, another door (which mirrors the disposition on the opposite side of the room) and then a longer partition wall. Behind the two doors, there is another small corridor that has another four doors. One door opens to the room next to the dining and living room, the second one provides access to the bathroom, the third one leads onto the rest room, and the last one provides access to the only existing bedroom of the house (Schneider & Till, 2007).

Actually, the architect proposes day and night use, entirely in the analytic-functionalist tradition. Opening the sliding doors during the day and folding the parents’ and older children’s
beds into built-in cabinets, providing an L shape living space with a sitting room and a playroom for the smaller children. The kitchen is designed to be efficient and minimal with a long Cabinet. It also has a door that opens onto the balcony, where the coal box is located (Komossa, 2005).

CASE STUDY 2: BERGPOLDER APARTMENT BUILDING

The Bergpolder apartment building was constructed between 1933 and 1934, it is considered a pioneer social housing block due to its height. The Bergpolder block is built in a working class area, in the north of Rotterdam (Martí Arís & Alegre, 1991).

The Dutch architect, Willem van Tijen, had a passion for designing empirical social housing. This building was one of the series of high-rise housing projects that Van Tijen designed in Rotterdam. The block includes 72 flats for small working-class households destined to couples or families with young children. It has nine floors with eight apartments per floor. They all follow the same type of floor plan design with an area of approximately 50 m². The spatial design of the Bergpolder flats is quite simple. Each floor is formed by four pairs of mirror-like flats which are accessed via a gallery (Barbieri, van Duin, de Jong, van Wesemael, & Wilms Floet, 2003).

The architect carried out a careful study in order to achieve efficient space in the flats. He wanted the flats to be practical and to create a roomy space sensation in them in spite of their small size. He also adopted the principles of a day and night floor plan. The flats dimensions are 8.2m deep and 6.2m wide, and have a clear height of 2.55m (Figure 4). Its spatial organization has been designed as follows: acceding from the gallery, one enters a corridor in which on one side is the kitchen and on the other side is the rest room as well as the bathroom. The corridor connects the entrance to the living room, which has a store cupboard on one side and on the other side a door that opens onto the children's bedroom (Figure 5). The master bedroom and the living room adjoin the balcony. They are kept separate from each other by a glass sliding door. During the day, the beds swing up into the wall and the sliding doors are opened (Barbieri et al., 2003).

![Figure 4. Plan view (Source: Authors)](image-url)
Glass sliding doors and folding beds create the possibility to use the flats in two different ways. During the daytime, the beds are folded up and the master bedroom joins the living room space; and the glass sliding doors are closed at night time (“Architecture in Rotterdam” n.d.). In fact, this separation via sliding doors allows improving the function and size of the living area throughout the daytime. Furthermore, the generated space, with a long dimension which is parallel to the windows of the balcony, creates a pleasant living room during the daytime (Gringberg & Bakema, 1977).

**DISCUSSION**

In order to develop the idea of "responding to changing needs" in housing, Van den Broek collaborated with H. Leppla, who undertook the research concerning apartments’ requirements. Leppla carried out detailed studies of the processes of night-time and daytime uses, according to various family members’ lifestyles. He related studies of day and night zones to the studies of the life cycles of the different household members and to their requirements and changing customs. In this work, he distinguished the different life phases that could perfectly occur in the course of a family's life cycle (baby, child, son, daughter, husband and wife). A dwelling, he argued, had to be able to meet all the functional needs of these individual users (van Eldonk & Fassbinder, 1990).

Following the consideration that the organization of architectural space is principal, the apartments’ fix spaces and elements as well as its flexible ones have been arranged (Figure 6). The dimension and spatial distribution of both apartments can be easily changed according to the occupants’ requirements during the day and night-time (Figure 7). In fact, not only is there a spatial independency but there is also a multilateral cooperation between architectural spaces and the liberty of choosing among the different options provided to the occupants throughout the day and night-time. As a result, the inhabitants can make multi-functional spaces, with minor changes, in both apartments. In the Vroesenlaan housing complex, the restroom and bathroom are integrated as a compact part of the layout while allowing considerable freedom to the remaining part of it. The restroom unit does not have any connection whatsoever to the kitchen and the open kitchen is connected to the dining room and a flexible bedroom. Together they can create an enormous space in the day time. Therefore, the flexible bedroom and the living room are integrated with each other so as to make a suitable space for the day time.

In both apartments, there is at least one bedroom which is defined as a multifunction space. These bedrooms are not accessible directly from the hallway and have ultimately given the inhabitants the opportunity to be able to extend their space for daily activities. The kitchen is one of the most important spaces in housing design. It is not only for cooking and serving foods but it can also be used as a dining or living room or a place where the family can get together and do their diverse domestic activities. The activities that take place in these spaces have a close connection with the spatial configuration of the buildings.
connection. As an outcome, their spatial layout must be in an adjacent connection, which consequently leads to reforming spatial hierarchy. In both projects, the architects have considered the kitchen and bathroom units as static spaces. In other words, they are placed on the floor plan as fixed-feature spaces. The living/dining room and one bedroom work as multifunction spaces. Space has been divided and organized based on spatial hierarchy by making appropriate connections according to its inhabitants’ needs, activities and lifestyles. In fact, organizing the interrelated flexible spaces has enabled its inhabitants' freedom of choice. Home spaces have the capability to be arranged and configured according to inhabitants’ lifestyles and changing requirements. Put another way, each family member has the autonomy to engage various activities in complete freedom. In both apartments, the organization of interrelated flexible spaces gives inhabitants the liberty to change their living spaces and helps achieve functional efficiency in housing.

**CONCLUSION**

Flexible housing presents an opportunity for inhabitants to participate in the design of their dwelling and to arrange their living spaces according to their lifestyles and needs by creating new and temporary spaces during the day and night time. Based on both presented case studies, architectural spaces may be subject to change in order to meet inhabitants' requirements. This entails the autonomy of incorporating various activities when necessary and enhancing the variability and versatility of the connections between adjacent spaces without any geometrical change in the form of the architectural spaces. In both of the apartments’ layouts, family members have been offered the opportunity to redesign and rearrange their household in accordance to their changing lifestyles. The dimensions of the rooms can vary when conforming new spaces and fulfilling new requirements without extra expenditure. If the number of house members increases, the dwelling's layout will have the possibility to change to a new layout. In fact, the flexibility of space in housing seeks to create diversity, dynamism and adaptability which are decisive in order to satisfy inhabitants’ variable needs. Spatial organization determines the boundaries of the functions of space in housing. Hence, it’s main task being that of arranging spaces according to its residents’ requirements. The spatial organization of the floor plans of both of the cases studied is based on the interaction between different parts of the dwelling, which are configured as far as their function is concerned by situating spaces in close connection. Sequential and interrelated spaces create new spaces with various types of spatial relationships by employing sliding doors, walls and flexible elements. These new spaces meet the needs of the

![Image](image-url)
dwelling’s residents, which arise from the activities of the family members during day/night-time. This spatial organization creates interaction between its domestic spaces so as to achieve functional efficiency. In an overall view, flexible housing gives its inhabitants the opportunity to get involved in the design process of creating a suitable spatial environment throughout their lifetime. This will notably present them with a sense of belonging to their living place by fulfilling their expectations as well as by adapting it to their different demands instead of taking an architecturally-predetermined approach. Flexible housing places its emphasis on the fact that advanced architecture not only is put forth through form, but is accomplished in practice by discreetly incorporating functionality and usability into the dwelling’s layout with the aim to accommodate the diverse needs of its inhabitants over a long period of time.

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WHERE SUSTAINABLE SCHOOL MEETS THE ‘THIRD TEACHER’: PRIMARY SCHOOL CASE STUDY FROM BARCELONA, SPAIN

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Abstract
Participatory evaluation of aspiring sustainable schools and their pedagogical potential has recently come into focus. A few authors have made a significant start in examining schools as both environmentally and socially sustainable environments, which might simultaneously represent the ‘third teacher’. However, discussion around this idea is new in Spain. This paper describes a participatory post-occupancy study conducted with teachers and pupils in Fort Pienc School, Barcelona, Spain. Findings reveal the pedagogical potential of the school’s spaces and fabric, characterised as ‘sustainable’, and highlight the aspects that the research participants feel are performing and underperforming. The paper concludes that if we want sustainable schools to be a strategy for renovating the educational process and for leading us towards a better tomorrow globally and locally, new models for exploring the pedagogical potential of sustainable schools should be developed and the efforts of all relevant parties synchronised; from architects to governments, from pupils to teachers.

Keywords: sustainable schools; the ‘third teacher’; participation; post-occupancy

INTRODUCTION
Faced with an ever-growing number of social, environmental and economic challenges, Wade and Parker (2008) stressed that we need to transform educational systems, because education has a central role to play in transforming our lives on the planet into more sustainable forms. Others like Gough (2005: 339) suggested that the “sustainable school is the most appropriate strategy for renovating educational processes and achieving quality education”. According to the Department for Children, Schools and Families (2008: 6) “A sustainable school prepares young people for a lifetime of sustainable living, through its teaching, fabric and its day-to-day practices. It is guided by a commitment to care: for oneself (our health and well-being); for each other (across cultures, distances and generations); and for the environment (both locally and globally).”

Across Europe, there are examples of schools designed with sustainability in mind, aiming to reduce their impact on the environment. A small number of architects and researchers have gone a step further, aiming to use school design as a vehicle to raise awareness about sustainability issues, and stimulate children to explore the same (Newton, Wilks and Hes, 2009). These environments are founded on the principle that a school’s spaces and built fabric can have an impact on, incite and even provoke learning, thus acting pedagogically as the “third teacher” (OWP/P Cannon Design, VS Furniture, and Bruce Mau Design 2010; Salama, 2009). Architects of those schools believe that “the curriculum embedded in any building instructs as fully and powerfully as any course taught in it” (Orr, 2002: 212).

Yet, even when schools are identified and labelled as ‘sustainable’, they usually address just the environmental dimension of sustainability. Although some architects believe that the school environment can act pedagogically as the ‘third teacher’, few authors have discussed how
teaching about sustainability principles can be embodied in the design of a school building. The pedagogical potential of sustainable schools is still under-researched and calls for a stronger empirical evidence base to support related practice. Participatory evaluation of such schools by teachers and pupils can provide a crucial part of this empirical picture (Khan and Kotharkar, 2012; Sanoff, 2008). Wishing to collect some more empirical evidence, develop new insights and suggestions for designing pedagogically valuable sustainable schools, the authors facilitated an evaluation of Fort Pienc (FP) school in Barcelona, Spain by teachers and pupils. The main novelty of this research is that it presents the first qualitative participatory post-occupancy evaluation of a school in Spain through the prism of sustainability and the ‘third teacher’.

**LITERATURE REVIEW**

**Sustainable school as the “third teacher”**

Relevant literature was reviewed in order to (a) develop an outline framework for understanding the ‘sustainable school as the third teacher’ concept; and (b) establish a set of sustainable school themes. This framework would in turn inform the design and analysis of the post-occupancy study. The literature review protocol determined that any publication would be included which in some form set out to describe what constitutes a sustainable school as the third teacher, with reference to the architecture and built fabric of the school environment. Relevant literature therefore included both evidence-based and practice-based studies.¹

Preliminary analysis revealed three sub-groups of literature. The discussion in the first group of studies focuses primarily on environmental sustainability issues; the possibility to reduce the environmental impact of schools. Such discussion is typically found in school design manuals that can help architects to apply the principles of energy efficient architecture, alternative energy sources, rainwater harvesting, recycled materials, cross ventilation, adequate combination of natural and electric light, etc. (see for example, CHPS, 2006; Targetzero, 2010; ASHARE, 2011).

The second group of studies consists of a number of examples that illustrate how school designs around the world were developed according to sustainability principles; again, mainly environmental. However, this group goes a step further and acknowledges the teaching potential of a school’s design and fabric. The UK’s Department for Education and Skills (2006: 9) observed that a building could be used as a “teaching tool”, while LPA (2009: 50) and Ford (2007: 6) suggested that sustainable schools could be “living laboratories” which can engage pupils and community in learning about environment and environmental stewardship on a daily basis. Gaia Architects (2005: 1) propose that sustainable school design should demonstrate and imbue in the learners awareness about sustainability issues. Additionally, Gelfand and Freed (2010: 248) argue that school facilities could be a vehicle for learning when environmental sustainability systems are visible; because transparent demonstration of sustainable behaviour has educational potential.

The third group of studies uses examples to illustrate how school design can respond to multiple sustainability themes (including and beyond the environmental), and, in addition, frames these with corresponding ideas from pedagogy. In order to inspire and provoke learning, for example, school environments should be rich in positive stimuli, initiate exchange of information, and provoke questions (Nair and Fielding, 2005). Schools should also support learning through discovery, investigation, exploration, experimentation and play (OWP/P Cannon Design, VS

¹ This paper draws upon research carried out by Marta Brković for a PhD at the University of Sheffield, School of Architecture, supervised by Prue Chiles and Rosie Parnell.
Furniture, and Bruce Mau Design 2010). According to Taylor (2009: 25) the physical environment of a sustainable school can be the “silent curriculum”, because the physical attributes of learning environments can be cues prompting learning. In this way, sustainable school buildings can be the best physical manifestation of good educational practice (Nair and Fielding, 2005).

Although a unanimous set of sustainability themes could not be identified, there was a core consensus, with a set of key sustainability themes appearing in the majority of studies. Following a process of coding, these themes were distilled as follows, reflecting the most common portrayal of the sustainability concept as a tripartite (Brković, 2013):

- social (safety and security; health; physical activity; food; sense of a community; participation; inclusion and equity; cultural diversity; sense of a place; education);
- environmental (school grounds; building construction and materials; light; ventilation; cooling and heating; water; waste and recycling; transportation; energy, new technologies); and
- economic (cost-effectiveness; operation and maintenance; new technologies and flexibility and adaptability).

This framework illustrates a broad set of agreed sustainability challenges to which every school should respond, according to the reviewed literature.

**Sustainable schools in Spain**

Today around five hundred schools declare themselves as “Green Schools” in Catalonia (Educational Department, 2012). Additionally, some schools have participated in the project “Creating Sustainable Schools” in order to raise awareness about sustainability through curricular and extracurricular activities (Etwinning, 2010). However, the majority of these schools address sustainability exclusively through their curriculum.

Between 2003 and 2013, thousands of schools were built in Spain using very tight time frames due to rapid rates of migration. This urgency to solve a lack of educational centers was the main reason for building new schools. During most of this period, Spanish building standards (2006) did not strongly advocate addressing sustainability issues through building design. Since 2010, Spanish school standards (Educational Ministry, 2010) and Catalan “Criteria for building new school edifices” (Educational Department 2001) have suggested including renewable energy sources, recommended reducing and managing construction waste, and proposed appropriate materials (Generalitat de Catalunya, 2006). Although, the lack of legislation in favour of sustainability is evident, there are some schools that have implemented the 2010 recommendations. To illustrate, Martinet Primary School, in Barcelona, has been designed to promote natural ventilation and reduce energy costs (Webecoist, 2011). The number of schools that use biomass is increasing (Biomass, 2011) and hundreds of schools have been built using off-site fabrication, lowering environmental impact during their production phase (Pons and Wadel, 2011). Some of these schools also use low impact materials such as wood (Bestraten and Hormias, 2009) and several schools were included as a part of a wider regional initiative to improve the energy efficiency of public buildings (European Commission Energy, 2012).

Additionally, Spanish sustainability assessment tools and methodologies are neither qualitative nor participatory. For example, VERDE is a quantitative tool not specifically intended for evaluation of educational buildings (Macias and Garcia, 2010); while MIVES (Pons and Aguado, 2012) is a quantitative methodology that has been developed by experts (architects, engineers and administrators) to assess the architectural technologies used to build the latest Spanish schools.
Challenges for the future

The application of technical and technological systems as a means to achieve environmental sustainability prevails in the discourse. Although technological solutions have contributed significantly to reducing the impact of schools on the environment, concentrating on this approach alone can lead to a fragmented approach to designing sustainable schools (Lippman, 2010: 1), ultimately neglecting the human factor in contributing to a more sustainable lifestyle. We need more research on how teachers, pupils and the other relevant users of sustainable school spaces are interacting with technical systems and, from these interactions, learn. Approaching the issue from another direction, the discourse around pedagogy, education and psychology as the basis for school design exists in a separate sphere to that around sustainable schools, with the two areas rarely engaging in dialogue.

There is a wealth of innovative ideas and experiments demonstrating how architectural design features could be used to support learning. Although the potential learning opportunities constituted by the physical fabric of a school are clear to see, very few of the relevant claims made have been supported by empirical evidence (UNESCO UIS, 2012: 58). Fischer (2005: 165) points out that “there is insufficient qualitative/deep research on the relationship between pedagogy and design of learning environments”. This is particularly true for schools designed with sustainability in mind, where pupils, teachers and other school users have rarely been engaged qualitatively in evaluating the environments that they inhabit. Clearly, a gap exists in the field between the literature on sustainable schools and that exploring schools as “third teacher”. This study begins to address this gap, offering one approach to bridging the pedagogical and the sustainable, through qualitative empirical research with school users.

RESEARCH AIMS AND METHODOLOGY

This study aims:

- to understand how teachers and pupils evaluate school design in relation to social, environmental, and economic sustainability themes; and
- to investigate how the architectural design of a school, has an impact on learning associated with sustainability issues.

These questions are examined through the prism of the sustainability themes identified through extensive literature review and analysis (see above), in the geographical and socio-political context of Spain.

As this study aims to better understand the ‘user’ perspective, a qualitative approach was chosen as an appropriate means to “document the world from the point of view of the people” (Hammersley, 1992: 165). The qualitative methods adopted here are framed as an opportunity to involve the research participants (school users) in supporting a “deeper understanding of social phenomena” (Silverman, 2008: 8); in this case, the use and inhabitation of sustainable schools as the ‘third teacher’. A case study strategy was adopted, offering the opportunity to build a rich picture of this phenomenon, in a particular context (Yin, 2008).

Setting

Fort Pienc primary school in Barcelona, Spain was chosen as the case study site. The most important criterion for selection was the architects’ intention and attempt to design a sustainable school in which the built fabric and design elements could be used for learning.

FP School is situated in the Fort Pienc neighbourhood in Barcelona’s Eixample district (Fig. 1). It is a public school which consists of a kindergarten (age 3-5 years) on the first floor, and a primary school (age 6-12) in the rest of the building. In 2006, the school moved into this building from a prefabricated one situated nearby. Today, with 3714m² it is a school for 500 pupils and 33 teachers. Together with a civic center, daycare, market, residence for elderly and library it forms the heart of the Fort Pienc community. As the whole neighbourhood lacked identity, big districts in
Barcelona were reorganised so that all the services were joined and used mutually in one community. The idea was that the school would use the civic centre facilities and vice-versa, in part to support a positive sense of community. The masterplan for the whole complex was designed by Josep Llinàs in 2000, with the school being designed later in 2005 by Pich-Aguilera Architects.

Figure 1. Fort Pienc school in Fort Pienc neighbourhood (Source: Brković, 2013)

**Method and participants**

The school’s head teacher was first contacted and provided with information letters and consent forms. Later on, she explained the research project, and forwarded the letters and forms to the interested teachers and pupils. All participants were volunteers. Pupils aged 10-13 years
(7 boys and 8 girls) divided into four teams participated in a photo expedition followed by a semi-structured group interview, and a game (Fig. 2). The game Spector – Sustainability Inspector was played on two different days.

The game consisted of four steps. The ‘Suspect’ step instructed pupils to pick from 22 cards with "suspected" sustainability topics extracted from the literature review. Each card was divided into two fields; "think about", which explained the sustainability topic and asked pupils to give their
opinion, and “answer and photograph”, which instructed pupils to photograph school spaces related to the sustainability topic on the card, based on their own opinions (Fig. 3). The 'Inspect' step invited pupils to take a camera and photograph evidence for their answer (Fig.4). These photos were printed out and brought back to pupils for the second workshop. During day two, the 'Discuss' step signalled it was time for the board game (Fig.5). By rolling the dice, each team of pupils moved from one field to another. When one team landed on a particular field, everyone would reveal the photos they had taken on that topic and discuss them. The 'Detect' step encouraged pupils to locate the space shown in their photos on a provided school plan. Beside the photo, they placed post-its with their comments (red arrow - negative comment, green arrow - positive comment and speech bubble - new ideas and recommendations for improvement). After presenting and explaining their answers the next team was ready to roll the dice. The game was played until all the photos were revealed and all sustainability issues had been discussed and mapped.

Figure 4. (Left) Pupils during suspect and inspect step of the game (Source: Pupils, 2012). Figure 5. (Right) Pupils during discuss and detect step of the game (Source: Brković, 2013)

Figure 6. Detail of the map with teachers' comments (Source: Brković, 2013)

In total seven female teachers participated in a semi-structured group interview with mapping. One at a time, each teacher had to draw a card showing one of the 22 sustainability topics and start the discussion. The conclusions of the discussion were written again on the post-
its and pasted next to the relevant places on the school plans provided (Fig. 6). The discussion workshops with both pupils and teachers were audio and video recorded.

**Data analysis process**

Stage one of the data analysis started with *a priori* coding (Stemler, 2001). The codes for the first level of analysis were already built into the research tool – the 22 sustainability themes extracted from the literature. The teachers’ and pupils’ positive and negative comments, suggestions for improvement, and corresponding photos were first coded in this way, followed by the transcribed interviews, this time with the help of NVivo computer program. Then all the data gathered under each sustainability theme was separately coded, allowing emergent sub-categories to be identified. In this way several key themes or messages under each topic emerged, supported by pupils’ and/or teachers’ comments and photos.

The variety of data collection methods used to address the research questions, coupled with the two separate participant groups, permitted triangulation of the results. According to Marshal and Rossman (1995: 143), this multi-method and multiple informant approach also brings the advantage that it can “greatly strengthen the study’s usefulness for other settings”. Interpretation of the data was further supported by existing theory and literature from the fields of architecture, pedagogy, and developmental and environmental psychology. This process ultimately led to the development of a key set of messages that might usefully inform the design of sustainable schools as the third teacher.

**FINDINGS**

The findings presented below are grouped according to their relevance for each sustainability theme. Translated quotations from the interviews and photos are used to evidence the key messages developed under each sustainability theme, whether these messages are supported by teachers’ comments, pupils’ or both. Pseudonyms have been used for all participants.

**Safety and Security**

The teachers and pupils in FP revealed that the position of the school within the community and their mutual connections can impact upon a sense of community, out of which a feeling of safety and security springs. Both groups explained that a myriad of activities, within the school and the civic center, support teachers, pupils and community members to work together, and get to know each other better.

Previous empirically based research has shown that knowing your neighbours and being known by them (Reay and Lucey, 2000), and building strong connections between the school and the local community (Langhout, 2004), is what helps pupils perceive certain environments as safe. Creating a safe sustainable school is the task of the whole community, where the school should be functionally integrated within the community (Atlas and Schneider 2007). In safe environments children can establish new relationships (Human Science Research Council HSRC, n.d.) and create, develop and share important local knowledge.

According to teachers, the size of the space relates to the feeling of safety and security. Teachers explained that narrow corridors easily get crowded and cause stress, strain and even vandalism (Fig. 7). An empirical study by Moore (1986) showed that high-density, crowded spaces cause psychological overexcitement; make children behave in a more aggressive, destructive, and less interactive way. In this way, the learning atmosphere can be severely disturbed.

The large majority of pupils stressed that the scariest places were in the basement where the gym is located. Luciano (pupil, 12 years), explains why:

“There’s a room for the equipment by the gym which is full of bugs and it is gross. We do not feel safe there…it’s scary when we are down there and the light is off” (Fig. 8).
This typical description pupils provided suggests that pupils associate the amount of light, the seclusion of a space and its cleanliness with their sense of fear or safety.

Edwards and Torcellini (2002) have suggested that well-lit spaces reduce fear and increase the feeling of safety. When building design produces isolated, dark spots positioned far away from supervision (Atlas and Schneider, 2007), such as a gym in the basement of this school (Fig.8), it causes children to be fearful. The lack of cleanliness in the room for sports equipment, locker rooms and toilets made children feel unpleasant. Through incivilities and signs of disorder, what a school meta-communicates relates to pupils’ perception of (un)safety (Langhout, 2004); transmits the message of responsibility and care, and impacts upon children’s perception of a place as (un)welcoming (Maxwell, 2000). Tackling these problems through architectural design of a sustainable school is necessary because children should feel safe, secure and calm to be able to learn.

**Physical activity**

Despite a series of design flaws that the pupils spotted, such as no vegetation, no shade from the sun or from rain, and no places for children who do not enjoy football and basketball, the playgrounds, inside and outside the school, were most frequently described by pupils as places that stimulate them to be physically active, and even learn. Marco, (pupil, 13 years), explained:

“We have fun everywhere on the playground, we can play, talk, exercise… sometimes we learn with teachers there… we love our time on the playground.”

As knowledge and action are interlinked, “the quickest way to activate the brain is to move” (Boys, 2011: 134). It has been argued that through physically challenging, but safe play and sport activities, children can not only stay healthy; but also learn about their bodies and the world...
around them, relate to each other, establish relationships, learn to express feelings, release tensions, solve problems and use language (Malone, 2007; HSRC, n.d.). Accordingly, the playgrounds were delineated as good places for bonding, building group cohesion and developing social skills. Oriol, for example (pupil, 13 years) said: “We often play basketball and football with our teachers or with kitchen staff” (Fig. 9).

Both teachers and pupils explained that they practiced sports together, and that non-teaching staff were sometimes included. These activities on various sport fields were described as enabling them to know each other better, feel closer, communicate easier and develop a stronger sense of community. Malone (2007: 8) argues that “play and recreational use of space…support communication, cooperation, appreciation, and responsibility”.

**Food**

All the pupils agreed that the raised beds are a valuable learning resource; they helped them socialise, demonstrate their skills and abilities. Simone (pupil 12 years) clarified why:

“We like the garden because we grow plants and learn about healthy eating, we play and have fun there…we are proud to have a garden…the vegetables we eat when they are grown make us healthy” (Fig. 10).

The children praised the raised beds not just because the food produced there made them feel healthy, but also because the activities around them helped them to learn and socialise. They all agreed that the activities around the raised garden beds were connected to the curriculum, and many parents and community members came to work with pupils there. On the other hand, what pupils reported as problematic was the fact that teachers saw the activities around cultivating plants and vegetables as fun and entertaining activities for the younger pupils, without also recognising them as serious learning opportunities.
The quality of food has an impact upon children’s health and consequently their ability to concentrate and learn in school (WHO, 2008). The activities around the raised beds present an opportunity for pupils to learn new skills, feel a sense of power, feel important to the community (HSRC, n.d.) and enable them to socialise and build group cohesion (WHO, 2008). The opportunity to take care of their environment offers a chance for children to exercise responsibility (Desmond et al 2004). Being in direct contact with nature, they are becoming sensitive to their environment and can develop skills for stewardship (Chawla, 2002). It could be concluded that food-growing facilities can be a valuable learning tool only when the learning activities around them are well-structured, connection to the curriculum is clear, and the roles and responsibilities of teachers, pupils and community members are well defined.

A sense of community

Interviews with teachers and pupils revealed that the position of the school within the community and the joint use of the facilities by school and the local neighbours are what foster the development of a sense of community. The “joint space use” strategy, alongside the limited space within the school, caused the teaching and learning to be taken outside the school walls. Trying to be as resourceful as possible, the school was using two nearby parks, Barcelona’s North Bus Station and all the facilities within the block (the square, the civic center, the children’s
center and the library) for curricular and extracurricular activities such as dance and theatre performances, recitals, concerts, fundraising for school trips, parties, parents’ meetings, and school exhibitions. Community members also had a strong presence within the school. Teachers and pupils explained that a native Pennsylvanian female student, living in the neighbourhood, regularly gave English classes to the children. Parents and community members introduced their professions to pupils, planted, cultivated herbs, vegetables, and fruit in the garden, and decorated the school. Such a rich array of activity with and by wider community members underpinned the general positive comments about the school, such as this from Julia (pupil, 12 years):

“Here we are all good friends…we have good relationships”.

Favourably positioned in the heart of the neighbourhood, this school is tightly interwoven into the community milieu. A multitude of activities in various school and civic center facilities are helping children to develop strong bonds, a sense of belonging, caring and responsibility. These close ties with the community can support both social and ethical development (Rigolon and Alloway, 2011).

The size of spaces and the opportunity for the levels of privacy to be regulated, strongly emerged as factors determining how successfully a certain space impacted upon the development of a sense of community. In FP, during the school breaks, many pupils could be found seated together in groups in different corners of the playground (under the stairs in the yard, behind the fences of the stairs, etc.) secretly whispering and playing games (Fig.11). Eva (pupil, 13 years) observed:

“We all really like the tables at the end of the playground, we like to sit on the benches…there we can play and talk with our friends in peace”, and Alba (pupil, 12 years) added, “We like to sit in a corner and talk about our things”.

Pupils preferred smaller, tucked in and out of the way places, where they can discuss things important to them. Yet, it was identified as a problem that the school lacks purposely designed small, calm and private niches that could stimulate encounters between the pupils and teachers.

Schools, like other (semi)public spaces, should allow levels of individual and group privacy to be regulated, as a uniform degree of intimacy decreases the possibilities for subtle interactions (Alexander, 1977). Beside the levels of privacy, the size of the space can have a crucial impact on social actions and interactions (Bell, 2006). Having a variety of smaller scale, lower height, tucked in spaces in schools enables encounters to happen naturally (Pasalar, 2004), and invite children to stop and communicate (Day, 2007). Empirical evidence shows that so-called “retreat and refuge shelters” can help children escape from intense everyday stimulation in school, offering an opportunity for pupils to form strong relationships and connections, discuss sensitive issues and learn to understand each other (Moore, 1986).
Inclusion

Both teachers and pupils were quick to point out how school design is hindering or promoting inclusion. While toilets for disabled people, lifts and ramps were delineated as features that promote inclusion (because everyone, regardless of their abilities can use them; e.g. pupils in wheelchairs, as well as pupils with a temporary leg injury); small and narrow spaces were named as obstacles that made movement cumbersome for wheelchair users. For example Agatha (teacher, 42 years) complained:

“There is not enough room, classrooms are small and corridors are very narrow...it [moving around] is not easy.”

Teachers explained that having children in wheelchairs in the school who will constantly have to be accompanied by teachers or fellow pupils in order to be able to move around, is no different than pointing a finger at those children. This implies that inclusion depends on compatibility between the functional capacities of a person or a group and their environment (Iwarsson and Stahl, 2003). Additionally, it has been argued that spatial relations can represent and reproduce social relations (Malone, 2007). In this way physical barriers can be transformed into social, emotional and mental ones. Hence, inclusive design has to take into account not just physical access, but emotional and intellectual issues as well (CABE, 2006).
Pupils’ comments and discussion revealed that feelings of inclusion or exclusion can be developed through (physical) activities in school yard, thus further weaken or strengthen a sense of community. All pupils stressed that during playtime, some of their friends were left out because football and basketball courts take up the whole outer yard. Some of them did not enjoy playing these sports, and some of them were not able to due to their disabilities. Diego (pupil, 13 years) commented: “There should be a place for people who do not play football or basketball… something, some activities for them to do” (Fig. 12).

Figure 12. Pupils who do not play football and basketball are left aside (Source: Pupils, 2012)

Tackling this problem through design and providing enough space with various engaging (physical) activities for everyone is crucial, because on sport fields and playgrounds children receive affirmation, gain visibility and respect from their peers (Atensio, 2007: 115). Engaging in physical activities, pupils take up certain roles, make judgments about themselves and others, and in this way construct their identities. According to CABE (2006), participation in physical activities impacts upon interpersonal relationships among children, as well as development of social hierarchy. These hierarchies in turn impact upon inclusion or exclusion.

A sense of place
The design of the facades and entrances emerged as an important element communicating a sense of place. According to teachers, the physical characteristics should correspond to the schools’ ethos. Yet the way FP feels and looks outside and inside is not representative of the schools’ pedagogical ideas, its strength in the art, music and environmental curriculum, or its core values and beliefs. The entrances are very small and unable to demonstrate the welcoming spirit of the school. By strictly following the language of the block, today the school building has
completely blended in, and there are no visual clues that behind these facades there is a school (see Fig. 1 above). It is been argued that by contrast, a carefully designed, authentic aesthetic for a school façade can attract attention and also transmit the values and the pedagogical ideas of the school, providing in-part the identity of a school and signalling how a community values education (Walden, 2009). Also the design of entrances is important as it can determine the type of messages and the pace of interactions cherished at schools (Ogden et al, 2010).

School design should be a skilful interpretation of the ideas, wishes and beliefs of school members, in order to contribute to a sense of place. Teachers explained that due to the tight budget, out-dated and strict government educational standards, the school today does not communicate their primary idea that learning happens everywhere and that all learning styles are supported. Additionally, pupils’ opinions on the overall look and form of the school were divided:

“There are other schools that are better, bigger and nicer” - Marco, 12 years;

“It has a strange shape” - Paolo, 13 years;

“The shape of the building is ok and the colours are very nice” - Celia, 14 years;

“I think the shape is a unique shape” - Gracia, 12 years.

Pupils could not name any distinguishing characteristic of their school space, explain how it was unique or special, explain how the school space made them feel, whether or not they were attached to it and whether it was personally significant to them. It is crucial that a school space is representative of a school’s values and users’ identities, because, as Proshansky, Fabian, and Kaminoff (1983) argue, place identity impacts upon a person’s self-identity and vice-versa.

**Light, ventilation, and cooling/heating**

Evidence from the interview with teachers and pupils suggests that light and ventilation, cooling and heating issues should be carefully designed from the start. It emerged that design oversights in this realm can have a negative impact on learning and working, and translate into extra spending. For example, Agatha (teacher, 37) commented: “Because we cannot move the blinds outside we had to buy curtains and movable blinds for the inside.”

![Figure 13. Façade with unmovable blinds with a bus station in front (Source: Pupils, 2012)](image-url)
The large majority of pupils and teachers complained that some windows could not be used due to the busy bus station below, exhaust fumes and very high noise levels (Fig. 13). Immovable blinds over large glass surfaces were ineffective, making the spaces too bright and too hot, especially during warm months. These oversights translated into extra spending to try to overcome the problems. Such issues should clearly be taken into consideration from the outset, because poor environmental conditions have been shown to negatively influence children’s cognitive development and cause underperformance on academic tests (Cohen et al, 1980).

**Materials, construction, and energy**

The pupils had easily picked up information about environmental sustainability issues from their school environment, despite not using the full potential of a school building as a teaching tool. Pupils were able to recognise sun blinds and sun protection panels as features that help the building remain cool, and reduce the electric energy needed for cooling; “push on taps” as part of the water saving strategy; and solar panels for water heating. Additionally, they reported a variety of behaviours that wasted energy and water and suggested many improvements in order to make their school more sustainable.

**Flexibility and adaptability**

When the flexibility and adaptability of school spaces is not a product of strategic design, but rather a necessary result of the lack of space, the quality of learning in those spaces could be compromised. A typical complaint of pupils was like the one from Martin (pupil, 10):

“the science classroom should be the science classroom and should be used as the science classroom!”. 

Both the teachers and pupils strongly agreed that the lack of space within the school forces teachers to constantly change venues for some classes and to hold them in inappropriate spaces for the subject, for example, the kindergarten bedroom is used for music lessons and the science classroom for dance lessons. (Fig. 14). This very often causes confusion among the children.

![Figure 14. Kindergarten room for sleeping is also used for music lessons (Source: Pupils, 2012)](image-url)

If we want to use sustainable school buildings as tools supporting exploration and learning, such conflicts should be avoided. Instead, resource-rich, flexible and easily arrangeable spaces in schools should be carefully designed as they can support social and emotional learning, practical experience, reflection and action, work in large groups or individual and quiet study - different intelligences, needs and learning styles (Nair and Fielding, 2005). Such spaces give pupils an opportunity to manipulate space, build responsibility, pride, and have an active role in
their learning process. In such settings, children are more active and engage themselves in more diverse activities (Cohen et al., 1987).

CONCLUSIONS AND RECOMMENDATIONS

In this qualitative study, giving a rich picture with greater depth of understanding has been a priority, instead of generalisation. The discovery of meaning that different participants ascribed, as a way of identifying important issues, was crucial. So that the key messages are made valuable for other settings, they were triangulated with a wide variety of literature available. However, further studies exploring sustainable schools designed to act as the “third teacher” are needed to strengthen our understanding of this field. Despite these limitations, the findings of this study could help us in future to design pedagogically more valuable sustainable schools.

The way school design addresses some of the sustainability issues here identified through literature review, can directly or indirectly act pedagogically. The raised beds in the school present an architectural response to growing demand for places where children might learn experientially about healthy nutrition and plants growing. Engaging with these features, through various activities, pupils can learn from those engagements. On the other hand, the way school design responds to a variety of safety and security issues, or a sense of community, indirectly contributes to the quality of the learning atmosphere within the school.

The layout, the design features, technical and technological installations should emerge from the contextual challenges, and should be in accordance with teaching and learning activities, methods, and approaches, so as to be pedagogically valuable. During the design phase in FP teachers suggested incorporating some technical systems that could be used as a three-dimensional teaching tool; however, due to the out-dated school building standards, architects could not translate this into design. Today, school building fabric does not correspond completely to teachers’ pedagogic vision and is not used enough for learning.

School spaces able to act as “the third teacher” were the ones where place, participants in the learning process, and learning activities were well connected and mutually interconnected. Pupils and teachers valued these places for what they could become through use. To illustrate, a very important factor impacting upon the pupil’s perception of safety in FP was the way teachers, neighbours, and parents work, take care, and protect the pupils. In this case, pupils associated space with the people and their close-knit relationships. Additionally, both the teachers and pupils in FP valued the garden and the places around the school (e.g. the plaza, the park) because they knew how to use these spaces and adapt them for various activities. The participants in this study associated space with activities occurring in them. Therefore, school space should not be seen just as physical entity, but as social and activity-based as well. The physical design of a school space is not the only factor determining how successfully a certain space can facilitate learning. The design of the physical fabric should be in tune with the curriculum, the type of activities, and the engagement of teachers and pupils, to act pedagogically.

Lastly, architects’ designs and visions do not translate directly into learning experiences of occupants. Even when architects integrate design features and installations, which have pedagogical potential, such as solar water heaters in FP, they should not assume that this is enough to incite learning. Choreographed space uses, taking into account the space, the participants in the learning process, and the activities, should be developed to support pupils and teachers to skilfully and knowledgeably transform their school space according to their needs, wishes and teaching and learning methods. The transformation process during the inhabitation could become a learning process through which occupants explore, get to know and positively appropriate their environment.

Focusing the discussion on Spain, many recently built schools have been constructed following tight time frames and low budgets. Though the economic situation carries strong limits,
schools should be pedagogically significant, leaving the opportunity for users to adapt, modify and personalise the environment. Collaborative efforts are needed to work towards this goal. Architects need to develop critical thinking in this area and be allowed to contribute to the debate at a policy level as well as at the local design level. In schools of architecture there is potential for the curriculum to more deeply and fully embrace sustainability and to support dialogue between sustainability and pedagogically significant theories. School building standards require modernisation to support both sustainability and pedagogy. Participatory school design and strong collaboration needs to be developed between educational departments, pedagogues, psychologists, architects and school communities to both build new schools and reconstruct old ones. Without such changes, there will be no significant improvement, the pedagogical potential of school buildings will remain underdeveloped and sustainable schools will remain isolated sporadic cases of good practice, as they are now, being an exception rather than the rule.

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PURPOSIVE TEACHING STYLES FOR TRANSDISCIPLINARY AEC EDUCATION: A DIAGNOSTIC LEARNING STYLES QUESTIONNAIRE

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Abstract
Acknowledging the progressive globalisation trend within the Architecture, Engineering, and Construction (AEC) industry, transdisciplinary education and training is now widely acknowledged as being one of the key factors for leveraging AEC organisational success. Conventional AEC education and training delivery approaches therefore need a paradigm shift in order to be able to address the emerging challenges of global practices. This study focuses on the use of Personalised Learning Environments (PLEs) to specifically address learners’ needs and preferences (learning styles) within managed Virtual Learning Environments (VLEs). This research posits that learners can learn better (and be more readily engaged in managed learning environments) with a bespoke PLE, in which the deployment of teaching and learning material is directly augmented towards their individual needs. In this respect, there is an exigent need for the Higher Educational Institutions (HEIs) to envelop these new approaches into their organisational learning strategy. However, part of this process requires decision-makers to fully understand the core nuances and interdependencies of functions and processes within the organisation, along with critical success factors and barriers. This paper presents findings from the development of a holistic conceptual Diagnostic Learning Styles Questionnaire (DLSQ) Framework, which is comprised of six interrelated dependencies (i.e. Business Strategy, Pedagogy, Process, Resources, Systems Development, and Evaluation). The confluence of these dependencies directly influences pedagogical effectiveness. These finding contribute additional understanding to the intrinsic nature of pedagogy in leveraging transdisciplinary AEC training within organisations (to improve learner effectiveness). This framework can help organisations better augment and align their strategic priorities to learner-specific traits.

Keywords: Transdisciplinary learning; Personal Learning Environments (PLE); Diagnostic Learning Styles Questionnaire (DLSQ); pedagogical effectiveness; organisational drivers

INTRODUCTION
The Architecture-Engineering-Construction (AEC) industry contributes to a large portion of the employment rate and economic growth in many countries. For instance, in the European Union (EU), the AEC industry encompasses more than two million enterprises and provide in excess of 12M jobs; about ten per cent of the Gross Domestic Product (GDP), and more than 7 per cent of job opportunities of counties across Europe (NGRF, 2010). Such engagement and contribution to the development of ‘wealth’ make the innovation of design and construction projects even more important than ever before. As such, organisations and professional bodies within AEC need more inspired professionals and graduates who are able to lead and champion more innovative projects - the throughput of which can help procure more sustainable societies to enhance the wellbeing and prosperity of people. Acknowledging this, AEC professionals are
increasingly being asked to deliver products that require complex skill sets; and transdisciplinary education and training has been openly acknowledged as being one of the key factors that can be used to leverage AEC organisational success. This however requires a number of important factors to be considered, not least, the appreciation of skill set development, delivery content [and context], pedagogy, and transdisciplinary nature of stakeholders’ needs.

From an instructional domain point of view (Kreber, 2004), noted a surfeit of approaches and abundance of teaching material for specific disciplines; but, noted that it was quite a challenging task when pedagogical aspects were included. This resonates with the concepts of delivering transdisciplinary teaching to people with different discipline knowledge and expectations (Fruchter, 2004). In other words, despite the availability of appropriate educational methodologies for individual disciplines within the AEC industry (and the corresponding broad range of skill sets required), it is often challenging to deliver these skills in a way that it is ‘appreciated’ by all learners, especially as they all tend to have different expectations and outcomes. The transdisciplinary Problem-, Project-, Product-, Process-, People-Based Learning™ (P5BL) approach (Fruchter & Lewis, 2003) has been proffered as an alternative technique to the traditional delivery of disciplinary education to AEC professionals. This universally validated method for transdisciplinary learning leverages learning from the lowest tiers of transdisciplinary teamwork understanding to the highest tiers. Where, Ibrahim et al. (2007) introduced four tiers of transdisciplinary teamwork understanding as follows:

- Island of knowledge: Learners acquire enough skills in their own discipline; however they have no idea about what is going on in the other disciplines;
- Awareness: They start to be aware about the goals and barriers within neighbouring disciplines;
- Appreciation: They form conceptual foundations to work with the other disciplines – and are now interested in their procedures and workings - and know what questions to ask when they meet experts with different backgrounds;
- Understanding: They have now built up the conceptual knowledge to approach, discuss, negotiate and work with the expert form other fields – and are prepared to deliver their own deliverables before being tasked by the others - and are aware of the experts who can solve their problems – and are able to use a common professional language, which is understood by all members.

One of the major issues of transdisciplinary education in AEC industry is how to tailor teaching materials to the environment in such a way that it suits various learner styles. This challenge has been debated in academic discourse by a myriad of seminal authors, supporting the notion that learning environments matched to learners’ learning styles can not only help improve learner motivation, but also enhance the learning process (e.g., Buch & Bartley, 2002; Karagiannidis & Sampson, 2004; O'Brien, 1989; Oxford & Ehrman, 1992). Personalised Learning Environments (PLEs) are particularly well suited for this, as they are able to match cognitive abilities and preferences to learner traits (Goulding & Khuzzan, 2014). For instance, from an organisational context, using Architecture as an exemplar, these learner types are predominantly ‘creative’ and ‘flexible’ [as opposed to procedural-driven roles]. The challenge therefore, is to appreciate these nuances; and more importantly, incorporate these into a training environment that not only helps foster and improve learning performance per se, but also helps align this to organisational need (Goulding & Alshawi, 1999; Kumaraswamy, 1997; Naoum & Hackman, 1996). As such, the adaptation of “purposive” learning styles devices and methodologies is now considered vital for ensuring that learning delivery methods are consistent with the learning styles (Goulding & Khuzzan, 2014). In this respect, universities (as organisations) are looking to improve not only the learning experience and performance of learners per se, but also improve how teaching and learning is managed and delivered as part of their organisational strategy. This
paper presents the core issues and drivers that have the potential to reap significant benefits for organisations engaged in learning delivery – especially, the process of tailoring material to learners with different multidisciplinary needs from the AEC sector.

In pursuance of this, a conceptual Diagnostic Learning Styles Questionnaire (DLSQ) framework was developed to help organisations support organisational resources more effectively. The principal raison d'être for this framework was to help key decision-makers diagnose learners’ learning styles in order to better align the learning process with learners’ needs, whilst maximising the deployment of teaching and learning resources. The development of the conceptual DLSQ Framework was divided into two stages. The conceptual DLSQ Framework (Stage-I) involved the development of a Diagnostic Questionnaire (DQ) as the core of the conceptual DLSQ Framework, the work of which placed learners as the main unit of analysis using a quantitative approach for data collection and analysis (Khuzzan & Goulding, 2008). The conceptual DLSQ Framework (Stage-II) used the development of the DQ [from the conceptual DLSQ (Stage-II)] as a vehicle to embed the learners’ learning requirements within a business setting.

This paper focuses explicitly on findings from Stage-II of this work – the development of the conceptual DLSQ Framework. From this, six interrelated dependencies (Business Strategy; Pedagogy; Process; Resources; Systems Development; Evaluation) are presented for discussion, as these are seen as the main organisational drivers to support Business/Systems Development theories (which are both needed to govern the DQ).

LITERATURE REVIEW

Learning dynamics and business performance

Knowledge has often been accepted as a shared collection of principles, facts, and rules; which, when appropriately marshalled, can be considered ‘knowledge assets’ [core competences, technology, processes, procedures etc.] in order to achieve competitive advantage. However, the process of achieving competitive advantage is much more than aligning knowledge assets to business issues, as more often than not, it requires the careful holistic engagement of organisational learning per se (Dodgson, 1993; Huber, 1991). This is an important factor in developing a learning organisation. The importance of aligning cognitive science with technological solutions is also increasingly providing new insight and understanding into learning, especially the ways learners develop skills. For example, PLE’s are now able to reflect the needs, cognitive styles and specific needs of learners, using cutting-edge technological interfaces, e.g. adaptable VLE’s (Pour Rahimian et al., 2014). Moreover, from an organisational perspective, it is also important to be able to measure and assess learning styles, as skills are important for meeting organisational goals. This is particularly important, as the incorporation of learning styles can also help improve learning performance, work performance, and overall productivity (Kumaraswamy, 1997).

From a business perspective, organisations are increasingly looking to improve their overall competitiveness through strategic positioning using ‘traditional’ economic theories of competition (Porter, 1985). Strategic positioning also needs to consider direction of travel (Morgan, 1990), the routes of which tend to be aligned to well-defined decision patterns (Walsham & Waema, 1994). Acknowledging these issues, invariably, this means that organisations have to adapt through a process known as change (or change management). The real challenge however, is not the change process per se, but the need to organise and align corporate assets (organisational systems, procedures, resources and skills), to business opportunities (Porter, 1985). Given that organisational skills are a fundamental part of leveraging business strategy (Sleezer, 1993), it is therefore important to consider how these [skills] are developed and managed within an organisational setting.
Education and training within AEC

It is globally acknowledged that a well-trained and educated workforce can provide greater productivity and flexibility, especially in fluctuating markets where agility is needed (Clare & Johnston, 1993; Hopp & OYEN, 2004; Tishman et al., 2012). Education and training can procure beneficial consequences with the adoption and adaptation of new technologies (Chapman & Tan, 1992). In this respect, education and training can be seen as a management tool and instrument for addressing knowledge and skills deficiencies in order to adapt learners’ qualifications to job requirements (Van der Krog & Warmerdam, 1997). Therefore, if successfully managed, knowledge and skills gained by learners (i.e. employees) can link to increases in productivity, business performance, and overall efficiency. Acknowledging this, education and training should be integrated with the long-term needs of the organisation (Cato & Gordon, 2009); as it can formally act as a conduit for linking organisational strategies and goals (Sleezer, 1993).

For example, within an organisational setting, learning is seen as a purposive quest to retain and improve competitiveness, productivity, and innovativeness – particularly useful in uncertain technological and market circumstances (Dodgson, 1993). Providing education and training for learners is therefore viewed as one of the most important aspects to be considered (Nel, 2011). On this theme, research has attempted to correlate the success of individual organisations with their education and training policies - as this is intrinsically linked to organisational success (Keep and Mayhew (1988)). Moreover, education and training is an important factor that can be seen to help facilitate an organisation’s expansion; whilst also developing its potential to enhance overall profitability (Cosh et al., 1998).

In summary therefore, knowledge and skills gained by learners (i.e. employees) have a proven link with productivity gains and business performance improvement - the supposition of which argues that education and training should be integrated with the long-term needs of the organisation (Kumaraswamy, 1997). Given this, tailored forms of education and training (Connor & Shaw, 2008) offers significant promise. At a more detailed granular level, this requires ‘personalisation’ [of learning styles], to better align education and training material to learners’ needs. There is therefore, a need to understand the diverse range of learning styles available and the instruments of learning styles used.

Learning Styles

There is now a significant paradigm shift from ‘conventional’ pedagogic approaches and methods of delivering training, towards more advanced approaches in order to address individual and occupational styles and needs (Zhang, 2008). Spanier (2001) acknowledged the importance of being more learner-centred, noting that learning experiences should no longer be confined to the physical limitations of classrooms - embracing hybrid courses and digital technologies to support student-centred pedagogy. However, whilst some have questioned the usefulness of learning styles (Delahaye & Thompson, 1991), it is also important to acknowledge that this discourse is still unfolding. More fundamentally, it is generally accepted that there is an intrinsic need to understand how learners learn, and how learning styles’ theories support the learning process. Where for example, Lindsay (1999) argued that if learners’ learning styles were taken into consideration [in the design of learning environments], then learning performance and satisfaction would be significantly improved. Given this, the application of learning styles theories continues to offer benefits as a mechanism for determining the value of cognitive and learning styles in education and training practice (Evans & Sadler-Smith, 2006). Learning styles instruments and PLE’s are also a fundamental part of this debate.

Personalised Learning Environments

Learning styles and the way individual learning capabilities and characteristics can be nurtured by purposive learning systems and PLEs have started to become the focal point of many
scholars (Karagiannidis & Sampson, 2002; Sampson et al., 2010; Stash et al., 2004; Wolf, 2002). In essence, the development of teaching and learning processes in accordance with individual learning styles and preferences has been advocated as a successful approach (Watson & Hardaker, 2005). The purposive learning concept indicates a paradigm shift in educational theory from the conventional approach, to one which engages PLE’s (Pahl, 2003; Sampson et al., 2010). The goal of a PLE is to provide digital (and remotely distributable) educational content to suit learners’ individual needs and preferences; which ideally, should also embrace learning styles (Goulding & Khuzzan, 2014).

The development of technology has now increased the demand for innovative approaches to deliver education and training. This has also been partly driven by a desire to design cost-effective and high quality e-Learning environments to meet the needs of learners. For example, Pour Rahimian et al. (2014) noted the use of ICT as a means for improving education in the field of pedagogic research, e.g. automation of educational procedures, leveraging e-learning by creating digitally distributable learning materials, increased emphasis on instructional learning, supported by clearer and more tangible e-Learning objectives and standards. Given this, the correlation between pedagogy and technology seems to be a significant aspect of this discourse. Where, Arciszewski (2009) asserted that emerging international trends and increased global distribution of knowledge through the World-Wide-Web, social media etc., was revolutionising higher education – as this underpinned knowledge-based economies. That being said, a “one-sized hat fits all” approach does not actually procure significant advantages. In fact, static or inflexible systems can actually often hinder the process. It is therefore advocated that individual learning styles and cognitive needs of the target students are fully embraced (Goulding & Khuzzan, 2014; Riding & Sadler-Smith, 1997).

Architecture and Urban Research Education: An Overview and Critique

The future of AEC education in general, and Architecture and Urban Design specifically, has been at the forefront of debate, particularly since the recent economic recession. Numerous studies have been conducted on the effectiveness of ‘conventional’ design studios within the architectural and urban design education. Similarly, the importance of instructors providing a strategy that is relevant to the style of each learner in design studio process has been asserted (Demirbaş & Demirkan, 2007). However, the majority of these studies have not advocated a traditional style of teaching architecture; but more through alternative methodologies (Demirbaş, 2001). For instance, Salama (2008) in a study titled “Integrating Knowledge in Design Education” argued that a responsive architectural design pedagogy that gave credit to socio-cultural, and environmental needs could enable future architects to create more liveable environments. Similar studies also investigated the implementation of purposive learning styles to leverage greater learner performance.

With regards to the major shortcoming of the current educational systems within the AEC discipline - especially requirements such as: hands-on real-world experience, skills for supporting effective communication with stakeholders, collaboration with different project partners, and effective business management skills; the efficiency of the traditional design studios approach is questionable. This is more pronounced when taking into account the individual and discipline based learning needs and styles of each learner (which can not readily be addressed by the current form of studio deliver). These kinds of issues support the need for a PLE approach, as these issues can readily accommodate learners’ individual and occupational needs and unique learning styles. Therefore, the learning process within architectural design studios is a fertile ground for adopting new approaches, as this is where AEC professionals have an opportunity to be encouraged, supported and inspired in order to enhance their overall creativity. Demirbaş (2001) noted the importance of learning style preferences in AEC education. For example, AEC as a profession is often delivered through myriad of discreet approaches within each phase of the
design studio process. As such, the facilitator of this delivery must by default be innovative (and flexible) enough to incorporate different types of pedagogic styles during each phase in order to accommodate different intellectual capacities and educational backgrounds. In this respect, the AEC sector is somewhat underrepresented regarding the formal adoption of learning styles per se, into AEC educational settings. The development of the conceptual DLSQ Framework was therefore considered to be timely in this respect. The next section discusses the development of this framework.

**RESEARCH METHODOLOGY**

The focus of this research was to help key decision-makers diagnose learners’ learning styles in order to better align the learning process with learners’ needs, which would then help organisations better leverage organisational resources to strategic direction. This paper reports on the findings of the development of the conceptual DLSQ Framework. The development of the conceptual DLSQ Framework adopted an explicit mixed methods approach (Holt & Goulding, 2014), as a procedural framework to guide this work, i.e. having the research philosophy guiding the inner research approach and research technique. A Positivist philosophical stance was adopted, rather than a Social Constructivist philosophical approach, as it was appreciated that there was a need to include both deductive and inductive approaches. A precursor to this required education and training-related theories to be evaluated. One single embedded case study was adopted (as the context), using a UK Higher Education (HE) establishment as the vehicle of investigation – hereafter known as University ABC. The single embedded case study was considered suitable [representative] as it typified a typical HE institution implementing technology enhanced learning.

The aim of this research was to develop a conceptual DLSQ Framework for use within a HE/training environment setting; in order to help organisations augment and align their strategic priorities and resources through viable business processes that maximises pedagogical delivery in order to improve learner effectiveness. This research did not aim to influence/change attitudes of the participants (which it is argued could be influenced through say action research); nor did it aim to study the behavioural patterns/psychology of participants (which could for example be better achieved through ethnographic research). The focus was on investigating contemporary phenomenon in a particular setting (an organisation) - which required obtaining data from multiple sources in order to understand the complex and real life social phenomena involved - hence, the need for a case study approach.

The complexity and diversity of the research made triangulation an essential element of this work, particularly to increase the validity and reliability of the research results based upon case study findings. In this respect, the case study in question developed the conceptual DLSQ Framework using a two-stage approach; whereby the conceptual DLSQ Framework (Stage I) concerned the development of the DQ (not reported in this paper), whilst the conceptual DLSQ Framework (Stage II) considered the development of the core interrelated dependencies (components) required to embed the core DQ within a business setting. The conceptual DLSQ (Stage II) process used the developed DQ [from the conceptual DLSQ (Stage I)] as the main vehicle for embedding this within an organisational context. In this respect, the organisational setting was defined as a HE education and training provider. Therefore, it was acknowledged that the conceptual DLSQ Framework had to embrace the core organisational drivers needed within an organisational setting if it was going to be successful.

**The Conceptual Diagnostic Learning Styles Questionnaire Framework**

The conceptual DLSQ Framework has the DQ at its ‘heart’, and is supported by six core interrelated dependencies/components (which represent the environment/context for successful delivery/operationalisation). The conceptual DLSQ Framework went through a two-stage
development in order to develop the DQ (Stage-I), and subsequently the surrounding environment (Stage-II).

**Development of the Conceptual Diagnostic Learning Styles Questionnaire Framework (Stage-I)**

The principal aim of the DQ was to help identify learners' learning style preference. In this respect, a questionnaire was developed by amalgamating learning styles from three 'core' existing models of learning styles - derived from literature, which categorised learners based on the way they perceived, processed, and organised information received (Khuzzan & Goulding, 2008). The findings from this development stage are reported in (Goulding & Khuzzan, 2014).

**Development of the Conceptual Diagnostic Learning Styles Questionnaire Framework (Stage-II)**

Stage-II of the development of the conceptual DLSQ Framework identified the interrelationships between the cores dependencies of the DQ in context to the learning organisational setting, i.e. University ABC. This section describes the development process of the conceptual DLSQ Framework, where the core interrelated dependencies/components were formulated using a case study approach. In pursuance of this, it was acknowledged that this needed to address learner's styles and needs, especially to overcome gaps in current instruments of learning styles (Khuzzan & Goulding, 2008). However, in order for the conceptual DLSQ Framework (Stage I) to be successful in personalising learning to the needs of learners, it also needed to support organisational needs, and by default, be embedded within a business environment. This led to the development of the conceptual DLSQ Framework (Stage II). The conceptual DLSQ Framework needed to embrace both the pedagogical and core-interrelated dependencies. Six core dependencies were identified through the development process; business strategy (BS), process, resources, pedagogy, systems development, and evaluation.

These six dependencies within the conceptual DLSQ Framework were considered dependent on each other (either directly or indirectly). For example, the importance of strategic direction requires resources, which requires processes etc. This is where the implementation of the DQ was seen as an important initiative to match opportunity with core capability – given the importance of education and training (Gratton et al., 1999). Pedagogical principles are considered backbone theories that govern good practice, and which form the primary rubrics where teaching and learning coalesce (Ward et al., 2002). Similarly, new strategies often cause changes in the business process, where objectives need to be appropriate to the planned outcomes of the organisation (Avison & Shah, 1997).

**Development of the Conceptual Diagnostic Learning Styles Questionnaire Framework (Stage-II) - Case Study Findings**

The conceptual DLSQ Framework (Stage II) was carried out using semi-structured interviews with three domain experts in order to capture how new systems (or the extension of an existing system) could be developed and implement within one setting (University ABC). A draft conceptual DLSQ Framework was prepared from extant literature findings to define the context delimiters and rubrics. This was piloted and validated prior to distribution. The challenge here was to ascertain the main operational issues regarding the interrelated dependencies. The semi-structured interviews were conducted with three domain experts. Findings from these interviews helped to shape and define the internal structure of the framework (Figure 1). From Figure 1, it can be seen that the DQ is supported by six core dependencies, representing: business strategy, pedagogy, process, resources, systems development, and evaluation. These core dependencies rely on the DQ as the central conduit through which interaction is managed. Each of these core dependencies has three separate sub-dependencies. These directly govern the operation and management of the parent dependency. In this respect, the relationship between the sub-
dependencies and core dependencies is represented by a solid two-way arrow line, which signifies a direct transfer of information/data for subsequent analysis within the core dependencies. The core dependencies are also linked to the central DQ through a dashed two-way arrow line, the depiction of which signifies an indirect information/data flow between not only the main DQ, and also the six core dependencies. For example, whilst the ‘Systems Development’ dependency shows a link between the DQ and ‘Evaluation’, and ‘Resources’, it does not show a formal link to ‘Business Strategy’, ‘Pedagogy’, or ‘Process’. However, there is an indirect link to each of these core dependencies through the DQ. In this respect, the DQ acts as a conduit through which information/data is transferred (on a direct needs-required basis). For instance, the ‘Business Strategy’ dependency identifies clear critical success factors, which governs and drives the way the ‘Systems Development’ dependency operates. This approach is followed for each of the other dependencies.

![Diagram of the Conceptual Diagnostic Learning Styles Questionnaire Framework](Khuzzan, 2009)

From an operational perspective, users can enter this conceptual DLSQ Framework at any stage, as there are no discreet direct entry or exit points. However, organisations that have not been engaged in the conceptual DLSQ Framework before, would normally commence the dependency ‘Business Strategy’ first, as this would help the development team within the organisation evaluate its current business strategy and drivers in order to determine whether there was a clear business case for the DQ. If this was accepted, then the critical success factors would be identified, and the raison d’être for all decisions would be stored in a Legacy Archive for further reflection. On this theme, the Legacy Archive acts as a central repository of information. It also enables process and phase successes and failures to be formally documented (for subsequent referral and reflection). This follows the principles of Organisational Learning. If however the organisation decided not to progress with the DQ, then the ‘Business Strategy’...
dependency would be terminated, and no further action would be needed. Should the organisation accept the need for the DQ, then the critical success factors from this would help form the rubrics for the DQ (and subsequent dependencies).

It is acknowledged that the precise use of the conceptual DLSQ Framework would differ from one organisation to another (as organisations tend to have different structures, strategies, drivers and mission statements). Given this, and from an organisational maturity perspective, organisations that have used the conceptual DLSQ Framework before would be more readily able to enter this Framework at any stage/iteration – typically through the Legacy Archive from one of the core dependencies (as they would have gone through the process of aligning requirements to deliverables identified in each of the six core dependencies). Another example might be to enter through the ‘Systems Development’ dependency, where users would need to discern what was needed regarding the implementation stage; and more importantly, where they were in the holistic cycle of procuring the DQ. In summary, the conceptual DLSQ Framework can be seen as a conceptual approach for gauging and assessing organisational maturity in terms of “where they are”, “where they need to be”, and “what needs to be done”.

VALIDATION OF THE CONCEPTUAL DIAGNOSTIC LEARNING STYLE QUESTIONNAIRE FRAMEWORK

The conceptual DLSQ Framework was validated independently with three domain experts, outside of the case study boundary. This approach was adopted in order to: maximise reliability and validity, and increase relevance viz generalisability and repeatability. The three domain experts used were deemed ‘representative’, covering both HE academic institutions, and a ‘typical’ external training provider. This expertise was considered vital for validation – the details of which can be seen as follows:

- Domain expert 1— an expert within the area of technology and systems development, with direct responsibility for the management, implementation and maintenance of a university’s VLE.
- Domain expert 2 — a Technology Innovation Manager at one of UK’s distance learning universities, with extensive experience in the innovation of teaching and learning technology for delivering the University’s VLE.
- Domain expert 3 — an Associate at one of UK’s leading independent training provider’s, with significant experience of strategic policies, procedures and investment decision-making.

Given the above, a qualitative validation approach was conducted to address: a) the construct validity of the conceptual DLSQ Framework, b) the usability and functionality of the conceptual DLSQ Framework, c) the validity of the processes within the core organisational drivers embracing the DQ (not reported in this paper); and, d) suggestions for improving the conceptual DLSQ Framework. The results and findings from the validation process were analysed and linked back to seminal literature for comparison and reflection.

The following section discusses the qualitative validation analysis of the conceptual DQ, i.e. the validation approach adopted for the conceptual DLSQ Framework.

The Qualitative Analysis: Validation Approach

This stage of research employed a qualitative approach for testing the reliability of Stage II of the conceptual DLSQ Framework using semi-structured interviews with three domain experts (elucidated above). The analysis encompassed analysing the feedback from three domain experts concerning the:

- Holistic view of the conceptual DLSQ Framework;
- Interrelationship of the integral dependencies identified (links and dependencies); and;
- Use and functionality of the conceptual DLSQ Framework within the context of an organisational setting.

Table 1 presents a summary of the feedback and comments made by the domain experts, obtained during the validation process of the conceptual DLSQ Framework.

<table>
<thead>
<tr>
<th>Conceptual DLSQ Framework</th>
<th>Feedback and Comments</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holistic Overview</td>
<td>• Good that Pedagogy and Systems Development are combined together</td>
<td>• Evaluation should be a general core issue to be addressed within all the other five interrelated dependencies/components; now it looks as if it is only an evaluation process for systems development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The conceptual DLSQ Framework was considered to be representative</td>
<td>• Communication should be included as one of the core interrelated dependencies/components to enhance the conceptual DLSQ Framework implementation within an organisational setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The interrelated dependencies/components identified were considered to be imperative for the successful development and implementation of the conceptual DLSQ Framework within organisations</td>
<td>• Technology should be included as one of the interrelated dependencies/components</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• BS should be replaced with Teaching and Learning Strategy</td>
<td>• Risk Management should be included as one of the core interrelated dependencies/components.</td>
<td></td>
</tr>
</tbody>
</table>

FINDINGS AND DISCUSSION

Results from the analysis of the validation indicated that the developed conceptual DLSQ Framework was accepted for use within a HE/training organisational setting, with some additional recommendations made to enhance its relevance (Table 1). The domain experts agreed that the identified six core organisational drivers (Figure 1) were sufficient for enhancing the implementation of the conceptual DLSQ Framework within an organisational setting. However, comments were made to further improve this – in line with the organisational drivers and their dependencies (Table 2). From Table 2, it can be seen that majority of the findings presented in this study aligns to previous works cited elsewhere.
### Table 2: Summary of Discussion and Findings/ new organisational driver/ dependencies

<table>
<thead>
<tr>
<th>Organisational Drivers</th>
<th>Comments By Experts</th>
<th>Recommendations By Experts</th>
<th>Cross-Reference With Literature Review</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>This dependency should be undertaken within each interrelated dependency.</td>
<td>This conformed to findings from literature, whereby (Ritchie et al., 1998) noted that the process of evaluation was complex, because it involved different people in the organisation, each of whom would be evaluating the system from different perspectives and for different purposes – which meant that the evaluation not only looks into the systems development per se, it also looks into how the system effected the whole organisation, with regards to process, resources, etc. (Avison &amp; Shah, 1997; Bruegge &amp; Dutoit, 1999).</td>
<td>In the context of this research, although the evaluation was illustrated if it represented the evaluation of the systems development, it is acknowledged that evaluation should be conducted within the processes of each ‘core’ interrelated dependency, i.e. they are implicit.</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Communication although was agreed to be one of the factors needed to enhance the implementation of the conceptual DLSQ Framework; it was acknowledged not to be included within the core interrelated dependencies within the conceptual DLSQ Framework as an implicit (and important) part of the whole development process.</td>
<td>Remain unchanged</td>
<td>Communication as an essential element of the project lifecycle (Bruegge &amp; Dutoit, 1999) especially as the relevance of communication in complex systems development projects is of primary importance – conforms with findings Many projects fail due to inadequate management of communication (Ashihwa, 2007; Pour Rahimian et al., 2008; Pour Rahimian et al., 2011).</td>
<td>Remain unchanged</td>
</tr>
<tr>
<td>Technology</td>
<td>Promoted as a factor which needed to be included in the conceptual DLSQ Framework; and this is currently included under the core dependency ‘resources’.</td>
<td>To include as separate issue as an organisational driver</td>
<td>This is an exceptionally valid point, and was captured through the conceptual DLSQ Framework in such areas as business strategy, process, resources, and systems development.</td>
<td>Remain unchanged</td>
</tr>
<tr>
<td>Risk Management*</td>
<td>Recommended to be included</td>
<td>Recommend to include the element risk management as part of the conceptual DLSQ Framework</td>
<td>Conforms with Lyytinen and Robey (1999) as systems development is often a high-risk undertaking.</td>
<td>Conforms with Lyytinen and Robey (1999) as systems development is often a high-risk undertaking.</td>
</tr>
<tr>
<td>Business Strategy</td>
<td>The domain experts felt that all of the detailed attributes established were more or less similar to what they were used to, and had implemented within their organisation (except for some different terminology)</td>
<td>Remain unchanged</td>
<td>Remained unchanged.</td>
<td>Remained unchanged.</td>
</tr>
<tr>
<td>Systems Development</td>
<td>1) Emphasised the importance of ‘people’ in systems development; as people and technology should go hand-in-hand. 2) The domain experts highlighted that the monitoring process should be shown as an ongoing process from design through operationalisation. 3) Evaluation can have a great impact towards the success of systems development, as it allows organisations to find out the status of their systems development in order to rectify this. Therefore, the inclusion of the Legacy Archive within each of the core areas was seen as a positive step forward in addressing these needs.</td>
<td>• Remained unchanged  • Should show monitoring as ongoing process  • Remained unchanged.</td>
<td>• Conforms with (Mager, 1962)  • Conforms with (Avison &amp; Shah, 1997; Goulding &amp; Rahimian, 2012; Ritchie et al., 1998).  • Conforms with (Cooper, 1990; Goulding, 2000; Sheath et al., 1996).</td>
<td>People considered as under the core organisational driver ‘resources’  Reflect in evaluation  Remained unchanged</td>
</tr>
<tr>
<td>Pedagogy</td>
<td>The domain experts also felt that all of the detailed attributes established similar to what they were used to, and had implemented within their organisation.</td>
<td>Remained unchanged</td>
<td>Instructional objectives were considered important as they lead to what is really needed to be delivered to learners, and to how it can be done. Conforms with (Mager, 1962; Melis &amp; Monthiervichienchai, 2004).</td>
<td>Remained unchanged</td>
</tr>
</tbody>
</table>
CONCLUSION
Due to the emerging transdisciplinary global projects, AEC projects are becoming progressively more complex. This is placing unprecedented demands on organisations to perform – very often with a moving landscape of deliverables. Acknowledging this, organisations are now having to engage new business processes and technological solutions to meet these challenges. This often requires employing high-level skill sets to deliver the solutions needed. It is therefore particularly important that the causal drivers and influences associated with creativity and transdisciplinary decision-making in global AEC teams are fully understood and supported. Cognisant of these observations, this paper advocated the use of purposive learning styles to consider, assess, and diagnose learner traits and styles (to meet transdisciplinary needs). A DLSQ Framework which includes a diagnostic learning styles questionnaire was presented as a possible way forward. This can help align e-Learning styles to different learning models. The proposed framework offers promising opportunities for embracing a broader background of cognitive aspects of learners. This work presents new insight and understanding in the field of social science and behavioural science theory, particularly the causal links and dependencies surrounding: learner styles, behaviourism, learner effectiveness, and motivational theory. More specifically, it also attempts to uncover new meaning on the nature of the learning process and how this links to pedagogy (through the understanding of learning styles) - especially how individual characteristics can be supported by learning systems. However, work of this nature is not without its cautionary caveats. In this case, research limitations include the inherent challenges of absorbing 'perfect' learner traits into an all-encompassing generic solution. Perhaps a panacea solution may never be fully available, especially as new concepts on theory generation are still unfolding.

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EDGE, CENTER, AND SPINE: EXPLORING THE MULTI-DIMENSIONALITY OF CONTEMPORARY LANDSCAPES IN MIDDLE EASTERN CITIES

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Abstract
This paper offers an overview of landscape interventions in three Middle Eastern cities and a positional interpretation of the way in which different landscape typologies can contribute to their socio-spatial and environmental contexts. The paper identifies three levels of contribution of contemporary landscape – edge, center, and spine - corresponding to three landscape typologies: the edge typology is a linear coastal landscape that acts as an interface between the city and the sea; the central typology is a city park that reactivates or regenerates a fragment of the city and communities that surround it; and the spine is an ecological infrastructure – a wadi - that articulates and curates the natural and constructed flow of water creating productive landscapes and public spaces. In undertaking the discussion and analysis, a multi-layered general methodology was employed. First, to induct generalities on three projects identified a literature review and analysis of development and technical review reports is conducted in order to elucidate a considerable number of issues underlying each landscape typology while classifying them under three main sub-headings that include contextual background, evolutionary design and planning aspects, and key spatial design features. Second, to deduct particularities concerning the contribution of each typology, critical discussion, reflection, and reference to some empirical studies are carried out with the intention of unveiling the contribution of each typology to its context and to the city within which it exists.

Keywords: landscape architecture; urban parks; urbanism; Middle Eastern cities

INTRODUCTION
New ecological imperatives and sustainability imperatives have induced changes in the approaches to Landscape Design over recent years, and the discipline has evolved to extend beyond its traditional functions and boundaries, encompassing more socio-economic and ecological functions in the city. Landscape urbanism, which originated with the work of Ian McHarg in the 1960s and has found increased implementation by leading landscape architects - such as James Corner, Gilles Clement, Chris Reed, Kongjian Yu – is one such approach that can be applied to the three landscapes presented here. Landscape urbanism refers to new scales and typologies of landscape that can go beyond the city to create ecological networks with the hinterlands (Wadi Hanifa, KSA). It also advocates for new social and economic improvements in the adjoining neighborhoods, going against the usual gentrification which accompanies the beautifying of urban public space, to become an integrated mechanism for creating green lungs in the city while becoming catalysts for integrated regeneration projects which include capacity building and micro-credits to preserve a neighborhoods social make-up (Al-Azhar Park, Cairo). Landscape Urbanism also extends to linear urban infrastructures that combine public space and landscapes that either accompany transport arteries or transform them into green corridors that connect public spaces and parks (Corniche – waterfront, Doha).
The projects presented here have been selected to represent this new socially integrated and ecological approach to landscape in Middle Eastern cities. While the Al-Azhar Park and Wadi Hanifa projects have been widely published and received awards, recognitions, and a considerable coverage in the international media, the Doha Corniche is as yet, not considered as a “landscape project.” Nevertheless, it has been the subject of several international competitions and numerous speculations, and is probably the most central and symbolic public landscape in the city of Doha.

When we refer to multi-dimension we speak of the expanded scale mentioned before, but also the multiple urban and social dimensions that these landscapes contribute to the city. These dimensions obviously depend on the urban context – geographic location, accessibility, publicness – of the landscapes, but also on the synergies and catalytic effects that these open spaces can create on the surrounding urban fabric and urban dynamics. In the three case studies, we present the landscapes as social and urban infrastructures, belonging to a “green network” that is increasingly becoming an important matrix of any city that aspires to sustainability. Aside from their “beautifying” roles, the social and urban functions of these landscapes are emphasized, including such issues as social equity and accessibility. The objective is not to compare between the three types but rather analyzes different types of contribution of each landscape typology. These include: creating a maritime façade for an emerging city, offering access to the water’s edge, providing social spaces for all the user groups, offering a central park that generates a series of regeneration projects at its edges, providing biological waste water treatment while increasing availability of water for landscape irrigation, amongst others. Our premise is to highlight the interdependent variables of sustainable urban qualities that confer to these landscapes “multi-dimensional” functions.

LANDSCAPE AT THE EDGE OF THE CITY: THE CORNICHE OF DOHA, QATAR

Contextual Background

Located halfway along the western coast of the Gulf, the 11,437 sq. km State of Qatar consists mainly of flat low-lying rocky desert and coastal salt flats or sabkha. The peninsula has a 563 km sandy coastline with numerous small islets, sand dunes and reefs. The types of habitats found in Qatar include sand dunes, hammada (Arabic for ‘unfruitful’) desert of rocks and gravel, rocky ecosystems, mangroves, sabkha (salt flats), wadis and runnells, and depressions called rowdat that collect fine sand. Qatar benefits from year-round sunshine, with temperatures ranging from 25° (74°) up to 45° (113°) in summer.

During the second half of the 20th century Qatar witnessed its first modern urbanization period accompanied by rapidly increasing oil production and lucrative oil export contracts. Today new development strategies have been initiated and implemented to diversify its economy; these have led to a second major urban transformation process. Doha, the capital city of Qatar, has seen rapid growth from a small fishing village community in the middle of the 20th century to a vibrant emerging regional urban center with more than 2.0 million inhabitants (Salama and Wiedmann, 2013).

The Corniche of Doha is perfectly engineered and designed landscapes, formed by landfill. In 1972 the waterfront promenade has been progressively shaped by successive landfills - formed following extensive dredging work carried out during the late 1970s and early 1980s, which reshaped Doha's coastline - and carved into a geometrically perfect arc that enables the city to look at itself. It is an urban and landscape design that contributes to a spectacular waterfront scenography, creating a strong visual relationship between the historic core of the city and the emerging new business district at the West Bay (Figure 1). The perfect crescent shape embraces the Bay of Doha, and is framed by two architectural landmarks, the modernist icon of Doha’s first steps towards modernization, the Sheraton Hotel, and the masterfully located Museum of Islamic Art by I.M. Pei, which marks the beginning of an
intensive phase of urbanization, that reacts to the global condition by introducing knowledge economy, cultural institutions, and state of the art building interventions. Between the historic city and the new West Bay towers, the landscape is punctuated with the narratives of the city’s development, with the post-independence institutions buildings – such as the Emiri Diwan, the National Theater, and the General Post Office and other government buildings. The Corniche can be likened to a vast amphitheater that surrounds Doha Bay - like a moving stage that is crisscrossed by the passing Dhows, commercial tankers, cruise ships and pleasure boats. Extending for several kilometers along the Doha Bay, the Corniche is a linear landscape of movement, animated by the joggers, walkers, and cars along its streets and walkways (Figure 2).
Evolutionary Design and Planning Aspects

The crescent shaped Corniche was constructed under the then new Emir Sheikh Khalifa bin Hamad al Thani who undertook the planification of a capital city for the new independent State of Qatar in 1972. Land reclamation—already practiced in several other Gulf countries—was proposed by Llewellyn-Davis as an alternative to acquiring land from private landowners – and, beginning in 1974, waste from dredging the deep water Doha Bay was used as landfill for the adjacent salt marshes and shallow sea areas. William Periera Associates was hired to develop the concept design for the West Bay area and the Corniche, with the total project area covering 2,000 hectares, which included the waterfront promenade and park overlooking Doha Bay (Nagy, 2000). The mechanism of land reclamation and the creation of Doha Bay was presented as a “beautification” project, turning shallow, unattractive salt flats into a turquoise deep water bay, creating an attractive central and visible location for real estate investment, public institutions and cultural and leisure spaces for the new independent capital.

In 1998 the Doha Corniche Project Competition was launched to solicit designs from seven leading landscape firms worldwide that included Jean Nouvel, Martha Schwartz and Zaha Hadid which were not implemented (Archnet, 2014). In the 2007 Qatar National Master Plan—QNMP, an important component of Doha’s Redevelopment Projects was the Doha Corniche Enhancement Plan. This plan foresaw an upgrading of the Corniche to confirm its role as the symbolic landscape of Doha—as a monumental destination and ceremonial corridor—to serve both Qatar’s residents and the increasing number of expatriate professionals, visitors and tourists. The plan, which included new parks adjacent to the Corniche, was part of a strategy to increase the number of parks and open spaces in response to a rapidly rising population and to develop more tourist attractions, including gathering places for arts, culture and recreation. The project involved the expansion of the pedestrian promenade, doubling it to around 14 km extending beyond the crescent in the north direction toward the historic city and Doha International Airport. It included plans to enhance the existing spaces and create new functional areas, to increase waterfront activities, and make the Corniche more accessible to vehicles and pedestrians in order to attract visitors and activities.

More recently, international architects (amongst them Kann Finch and Symbiosis Architects) were asked to submit projects for the redesign of the 25km Doha Corniche district to provide a pedestrian-based community in an area currently dominated by cars (Figure 3). A scheme proposed by Kann Finch divides the Corniche into five key sites offering different opportunities and design outcomes (Kannfinch, 2013). A new light rail line with adjacent walking canopy is integrated into the entire ring of waterfront land in order to foster pedestrian activities while offering an alternative to cars. One of the major design challenges, the sustainability of green landscaped areas, was achieved by water re-use strategies to the Emir’s office (INNOCENT, 2003). By and large, while the overall plans for improvement of the Corniche lie stagnant, three parks have been designed and built (or are in final construction phases) which are directly connected with the maritime crescent. The Al-Bidaa Park, which runs parallel to the Corniche, is the first to have been realized, followed by the Museum of Islamic Art (MIA) Park, and the Sheraton Park, which is still under construction.

Key Spatial Design Features

The Corniche Promenade: Originally, the “Corniche” referred to the properties and roadway adjacent to the city of Doha, and was composed of three sub-areas—the Corniche Park and promenade, the Corniche roadway, and the strip of government buildings overlooking the park and the bay. It was intended to become the social, spatial and symbolic center of Doha, with the system of ring and radial roads radiating outwards from the Bay to the east. It continues to play this central role in the ever-expanding multi-centered city (Nagy, 2000).
While projects are now being envisioned to extend the Corniche landscapes and cultural spaces, the discussion here is limited to the 7 kilometer crescent bay waterfront promenade, as well as the adjoining waterfront parks and public spaces. These include the Sheraton park, located at the northern extremity of the Corniche, connecting the waterfront promenade with West Bay and the new convention center, and the Museum of Islamic Arts Park marking the Southern tip of the arc. Both these parks are associated with major landmarks, the distinctive pyramid-shaped Sheraton Hotel, and the singular and insular Museum of Islamic Art, built on the water.

Aside from its perfect and dramatic geometry, the Corniche does not have any salient design features. Albeit, on National Day and other special occasions such as religious and civic holidays, and visits from foreign dignitaries, the roadway is decorated with elaborate lighted arches, decorative lightings, flags and temporary landscaping (Nagy, 2000 and Wiedmann et al, 2012). The Corniche road itself consists of a six-lane roadway lined with palm trees, flowerbeds, and sculptures that symbolize the Arab culture. The roundabouts along the Corniche also function as important landmarks in the cityscape of Doha with public art, usually sculptures, at their center, representing scaled-up or abstracted elements of Qatar’s past heritage (Bedouin Coffee Pot, abstraction of Qatari fabrics), or symbols of Qatar's new global position (a world globe, a monument depicting Qatar's membership in the Gulf Cooperation Council). The Corniche has few cafes and restaurants, but there is one restaurant on the water more or less at midway along the promenade as well as Karak and snack kiosk that act as people hubs along the promenade. Electrical Bicycles are on hire near the Sheraton.

A series of lawns with shade trees are repeated along its length, and seating areas are provided through low walls and benches. The outer edge of the maritime walkway is designed as a seating area, which also acts as a guardrail, preventing access to the water. There are very few areas with access to the water, with the exception of a very small beach where Jet skis can be launched during competitions and events. There are no pontoons or jetties for access to pleasure boats or the tourist Dhows, but the boats extend their gangplanks directly onto the walkway to pick up passengers. Despite the visually stunning environment, public toilets and amenities
appear to be insufficient. This hinders people to stay for a long time although there is another incentive for long stay; a WIFI network provided in key areas along the promenade.

The Sheraton Park: The Sheraton Park is the creation of a renewed public green space covering the area from the Doha Bay Corniche to the Sheraton Hotel, just across from the West Bay emerging business district and the Diplomatic Area nearby. The project - currently under construction - includes the design and creation of a public park, a two-story underground car park accommodating around 2,000 vehicles, in addition to a tunnel connection leading to the convention center being constructed adjacent to the Sheraton Park (Figure 4). The proposal also includes a maintenance-depot and a control center for Doha's future light-rail passenger transit system and two connecting entry-and-exit tunnels. According to the developers, Qatar Diar and DaVinci. The project consists of a 73,000 sq. m. public park of “exceptional quality,” including basins, water fountains, children's playgrounds, cafes and restaurants (QDVC, 2013).

Figure 4. The New Sheraton Park (under construction) (Source: www.QatariDiar.com)

MIA—Museum of Islamic Arts Park: The Museum of Islamic Arts Park was developed by Qatar Museums Authority (QMA) and is located on the grounds of the acclaimed Museum of Islamic Art, which was designed by I.M. Pei and opened in 2008. The 70-acre public park – also designed by I. M. Pei associates to complement the Museum – is formed by landfill, creating a new arc-shaped pier – a mini-corniche lined with palm trees - and a landscaped peninsula with dune shaped hills covered in grass. The circular promenade provides visitors with a full panoramic view of the Museum, situated on the water adjacent to the Corniche and the hills and terraces of the cafes offer spectacular views of the Doha Bay and skyline. The focal point of the park is a site-specific public artwork entitled “7” by the internationally acclaimed American artist Richard Serra, his first work in the Middle East. The sculpture consists of seven rectangular pieces of weathering steel approximately 24m. tall by 2.44 m. wide by 100mm. thick leaning against each other in an approximately 7-meter diameter heptagonal plan configuration.

The Museum of Islamic Art Park features about three kilometers of lighted pedestrian pathways shaded by native palm trees that connect it to the main shoreline of the cornice (QMA, 2007). The park itself is designed as a grand lawn of sloped geometrical planes with two valleys. A series of tent structures within the valleys of the landscape complement the geometry of the hills. The tents function as open gathering places covering kiosks/ program elements such as a café, restaurant and restrooms to serve the general public. The park also contains children's activities and other cultural amenities and offers cultural, education and recreational activities for all ages. Visitors may also find paddleboats for rent in a small cove in Doha Bay as well as complimentary WiFi access throughout the park and interactive digital signage is available with information on various activities taking place around Doha. Year-round public activities at the Museum of Islamic Art Park include film screenings, jazz concerts, sports events, storytelling
programs and art workshops. Forthcoming program elements include an amphitheatre with a floating stage located at the east end of the peninsula and a future formal restaurant at the west end of the peninsula.

LANDSCAPE AT THE CENTER OF THE CITY: THE AL-AZHAR PARK, CAIRO, EGYPT

Contextual Background

Contemporary Cairo encompasses fragments that represent a symbiosis of urban, natural, cultural and economic processes. Much of what manifests itself today as Egyptian politics, knowledge and culture was and is the product of the modern physical, socio-cultural and socio-economic realities of this city. History adds another dimension to Cairo’s architecture and urbanism. It reflects the intersection between place, society, culture and technology. This has made it a complex and diverse city with over 18 million inhabitants and a range of established traditions, where the symbols of religious, political, institutional and economic powers are often competing (Salama, 2002). Accelerated population growth has had a severe impact on the city’s infrastructure and services where the capacity to cope with that growth is really limited. Immigrants from rural areas to the urban metropolis continue to live in squatters’ settlements on the urban peripheries of the city. This in turn has increased the pressure on the public services thereby attracting substantial political attention at the expense of other issues where the need for open green spaces has become an urgent necessity (Salama, 2008).

In 1984, the project’s idea came into existence at the Aga Khan Award for Architecture’s conference titled *The Expanding Metropolis: Coping with the urban growth of Cairo*. With the clear decline in Cairene housing quality, the development in addition to the conservation of the city became a critical concern. Conceived as an urban park, the aim of the Al-Azhar Park project has been to bring some greenery and open spaces to Cairo, a city with about one footprint of green for every resident (Figure 5). Scarcely found in park settings, the park’s site is the located derelict 30 hectare Derassa neighborhood, abandoned for over 500 years, bordering the 12th century Ayyubid wall, the 15th century Mamluk City of the Dead, and the vibrant historical yet ever decaying Darb Al Ahmar district. For the project to be successful this neglected land would need to be environmentally revitalized and the bordering Darb Al Ahmar district would need to be rehabilitated (Figure 6).

The Al-Azhar Park was inaugurated in Cairo in March 2005. The project is regarded by the local authorities, the developers, and the planning and design team as a catalyst for social, economic and cultural sustainability and is believed to have far reaching consequences for the 200,000 residents of the neighboring Darb Al-Ahmar district. It was conceived in the mid-eighties as a metropolitan park that offers much needed greenery and open space to the residents of Cairo. Characterized by distinctive spatial qualities the planning of the park is conceptualized as a series of self contained zones along a central circulation spine and secondary axes (AKTC, 2001). The project was – and still is -- celebrated in the media, and has received a considerable coverage in over 100 publications in different languages including local newspapers, tourist information packages, and specialized international and regional architectural trade magazines.

Evolutionary Design and Planning Aspects

A number of seemingly far-reaching project objectives were identified at the urban scale and much beyond horticultural aims throughout the early master planning of the project. Among those objectives was the engenderment of an urban park that would make the greatest and most skilful use of the site’s location as a representative of Old Cairo by making use of any available skills and spreading new skills through training programs. It was aimed at serving and benefiting foreign and local tourists as well as all socio-economic groups within Cairo. Thus, a resulting objective was to promote the development and progress of the area, and to develop the area and the park with careful consideration of the surrounding culture and heritage (Salama, 2014).
Directed by the Aga Khan Trust for Culture (AKTC) and coordinated by Sites International, the master planning was complex and methodological, combining foreign and local expertise. The existing topography was assessed and analyzed and the grading analysis was performed with tools based on CAD. The location’s prevalent vehicular and pedestrian patterns increased the need for a main parking area in addition to the pedestrian walkway present in the entire park. This walkway coherently connected all park features and areas while overcoming the innate differences in elevation that have reached 30 to 35 meters of high points above low points.

To achieve the project’s aims, green spaces were increased and maximized to take up to 10,000 persons in any given day. During the early stages of the master planning of the project, nurseries, housing over 2 million plants and trees, were created on site and outside Cairo as a place for the team to collect and distribute the Park’s needed stock of plant variety. The park is furnished with 89 varieties of trees, 51 shrubs, 5 types of grass, 14 climbers, 50 groundcover plants, and 26 varieties of succulents. As an advantage, the diverse seasonal variations of plant life are a natural and automatic result of Egypt being home to a variety of plant species.

The Park’s irrigation system is made up of a central irrigation management system stemming into a combination of a pop-up head system for areas of low slope and a drip feed system for steeply sloped areas. This eases the management and monitoring of the water usage. In cases of emergency if the main water line becomes disconnected from the Nile, the lake at the south of the Park doubles up as an irrigation water reservoir to supply the irrigation system with ample amounts of water.

Besides the formation of the Park, one of the teams’ objectives was the redevelopment of Darb Al Ahmar district and the restoration of the Ayyubid wall and other landmark buildings. The clearance of the slum upon which the Park was built was part of the socio-economic concept of
the project, intended to improve the overall condition of the surrounding districts. Cultural monuments and homes were renovated. After surveying the area's residents, a list of priorities as viewed by the residents was developed. These priorities included but were not limited to training programs, sanitation, housing rehabilitation and renovation, micro-finance, employment, and health care (Figure 7).

Figure 7. Al Darb Al Ahmar District (Source: Salama, 2008)

Key Spatial Design Features

Overall, the park was conceived to include: main spine (palm colonnade); formal garden; hilltop lookout kiosk; hilltop restaurants; children's structured play area; children's amphitheater and stage; lookout plaza; water cascade and stream; lake; These elements are missing from most public spaces in Cairo and thus relate the behavioral and experiential aspects underlying spatial quality (Salama, 2002, 2008). The park was strategically planned to provide an exceptional panorama of prominent monuments, such as the Citadel and the Sultan Hassan Complex to the south of the Park (Figure 8). From a hilltop restaurant in the northern section of the Park towards the citadel runs a linear main spine that ends at the southern section of the Park at a manmade lake and a lakeside café, which provides a scene of Um Sultan Shaaban mosque and minaret combined with the Citadel. Stemming from the main spine are numerous smooth and flat areas of lawn and flowering trees and plants, unlike the steep slopes across from the Ayyubid Wall, which are used to stabilize the soil by the treatment of xerophytic plants and ground cover.

At the south side of the site, the artificial lake, measuring over 6000 sq. meters, considerably modified the dry land conditions of the area. Beautified with the unique plant life, the surrounding green fields provide the Park visitors with a balance of nearby services and relaxation in a garden setting. Dramatically situated adjacent to the lake is The Lakeside Café, designed by French architect Serge Santelli, overlooking eye-catching views. The café can
occupy up to 150 persons in their interior and external seating areas at once. It offers a notable balance between contemporary style and principles of Islamic gardens. Such principles include the prevalence of symmetrical compositions, the use of waterways and other water features, the commonness of shade areas, and the Mashrabiya. Further south is a community playfield open to nearby residents as well as Park visitors. All the abovementioned Park features are evidence that the Park is conceptualized as a series of areas and sub-areas or enclosed zones along the central passage system.

At the northern section of the site a hilltop restaurant was designed to simulate conventional Mamluk architectural motifs and themes (Figure 9). This restaurant, catering up to 300 persons, includes large indoor and outdoor facilities on different ground levels. These facilities include an external terrace, and internal banquet hall, a gallery space and a manzara (roofed overlook porch). Further north is a small amphitheater with a stage and nearby services was created on the western side facing a major round 12th century tower and serves the park’s musical program.

A very rare and valued feature in Cairo is that the Park is essentially free from cars beyond the parking area. This feature makes the Park more unique and appreciated by its visitors. Inside the Park, in the car free zones, visitors may be transported within the park in a small rubber tire train, while the Park operations team uses electric vehicles (i.e. golf carts). All park areas are lit at night including the major routes and plaza spaces. Direct lighting is rarely used. Yet, tree lighting and lighting of the water elements have been used to provide sufficient lighting, thus allowing the public to visit until midnight.

At the macro level, the Al-Azhar Park’s profile is totally treasured by the larger city. As shown from aerial photos, the uniquely greened Park is seen as a buffer zone separating the Darb Al Ahmar district, the famous historic sites, and the surrounding commercial districts. Through out history, Cairo has actively applied and implemented important civic projects. While environmental rehabilitation has just begun in many major cities worldwide, the Al-Azhar Park project along with the redevelopment of Darb Al Ahmar district is a clear step to continue this tradition.

Figure 8. View of the Pedestrian Promenade showing the Hill Top Restaurant (Source: Salama 2014)  
Figure 9. Hill Top Restaurant View (Source: Salama 2014)
LANDSCAPE AS THE BACKBONE OF THE CITY: WADI HANIFA WETLANDS, RIYADH, SAUDI ARABIA

Contextual Background

Riyadh can be best described as a city of various cities. The old town of Diriyah and many other old settlements were absorbed by the metropolitan area and diluted within its urban structure. Subsequently, the concept of urban identity took different directions because Riyadh itself expanded beyond the inhabitants’ imagination. Today people visualize Riyadh mainly as North-South spine that connects the old center to the new King Abdullah Financial District along the King Fahad Road (Al Naim, 2013). Other parts transformed to a peripheral extension of the city without real impact on the holistic urban identity of Riyadh.

Riyadh, the capital of Saudi Arabia, was founded on the west bank of Wadi Hanifa, taking advantage of water, stone, and arable lands. Following the rapid expansion of the city that started in the mid-1970s sections of the Wadi (Valley) were turned into wastelands or dumping grounds, while other areas were quarried and mined to provide construction materials for the rapidly expanding city. The subsequent encroachment of constructions and infrastructures, as well as the proliferation of pollution, poor water quality, and water-related diseases were the results of such uncontrolled development.

The Wadi Hanifa Wetlands is a restoration and development project of a Wadi that connects the agricultural hinterland to the capital city of Riyadh, creating an ecological landscape infrastructure. With a length of 120km long and a 4500km² watershed, the valley - located in the middle of the Najd Plateau of the Kingdom of Saudi Arabia – it is the most significant natural feature in the dry desert region. Once a heavily polluted river, the Wadi was filled with industrial and municipal waste and dead animals and fish, which had an adverse effect on the whole riparian ecosystem along its banks and catchment area. Through an innovative and contemporary processes of naturalization and bio-remediation – led by a team of planners, landscape architects and engineers over a period of almost ten years - the Wadi Hanifa ecosystem has been restored and new public spaces and productive landscapes have been created along its banks (Figures 10, 11) (Moriyama & Teshima Planners, nd).

In Riyadh, precipitation averages 60 millimeters per year with short intense rainfalls that cause flash floods and while water is abundant, the population growth from 150,000 in 1960 to an estimated 5 million today has put a strain on water resources. With the construction of Riyadh’s first large sewage treatment facility in 1982, the Wadi – which was traditionally dry except during heavy rains and floods – was supplied with up to 650,000 cubic meters of runoff that are channeled into the river daily, spontaneously creating a new green corridor and a series of small lakes south of Riyadh. These have become a popular destination for recreational activities and a haven for migratory birds, as well as providing irrigation for date palm cultivation along the Wadi’s banks. This runoff water also serves a large oil refinery and is used to irrigate the public gardens and parks of Riyadh.

Evolutionary Design and Planning Aspects

In 2001 the High Commission for the Development of Riyadh commissioned the planning and engineering office Moriyama & Teshima and Buro Happold to develop a Comprehensive Development Plan for Wadi Hanifa that would address the uncontrolled expansion of the city and the continued misuse of the valuable Wadi, restoring the Wadi to health (Moriyama & Teshima Planners, nd) An initial Strategy plan of 1994 developed by the Arriyad Development Authority (ADA) for the restoration of the Wadi was partially implemented, but it was realized that a more comprehensive plan and strategy were necessary to coordinate the restoration and development of Wadi Hanifa and to create new opportunities for recreation, tourism and water recycling. The Wadi Hanifa Comprehensive Development Plan - based on a ten-year program - was developed around newly defined flood boundaries of the Wadi and included engineering and landscape
designs for the restoration of the Wadi from the Al-Ilb Dam in the north to Al Hair in the south. The aims of the comprehensive plan involves a number of parameters that include a clean environment, accessibility, environmental quality, public landscape and cultural resources - in order to attract private investment for private-sector projects and private sector tourist investment.

Figure 10. The Greater Riyadh Area and the Location of the Wadi Hanifa Watershed. (Source: Moriyama and Teshima Architects)

Figure 11. Master Plan of Wadi Hanifa Development Project. (Source: Moriyama and Teshima Architects)

The design team conceptualized a comprehensive strategy to restore and develop Wadi Hanifa as an environmental, recreational and tourism resource, including the introduction of landscaping, conservation of the natural environment, development of recreational areas for the people of Riyadh, enhancement of agricultural land in the valley, and the creation of an environmentally sensitive wastewater treatment facility that provides additional water resources for the rural and urban inhabitants of the region (Archnet, 2014). The Wadi is designed to continue developing and growing according to the natural processes that have been allowed to
reclaim their course (Burohappold Engineering, nd). Currently the ADA is looking at further ways of enhancing the main Wadi and to develop and restore many of the sub-Wadis, to bring these into what is becoming more than the ‘Great Park of Riyadh’.

The implementation of the master plan was divided into two parts: The first is the Wadi Hanifa Restoration Project to restore flood performance and water quality, and to complete the restoration of the Wadi bed and the second is Wadi Hanifa Development Program, for the public infrastructure and public landscape capital construction works with associated private sector investment projects (Samhouri, 2010).

**Figure 12.** Interpretative trails that wind their way throughout the Wadi allowing the public to access the area easily and to direct them to places of interest (Source: Aga Khan Award for Architecture)

**Figure 13.** Public Space along the Wadi Hanifa. The parks are designed in a way that provides family compartments, in the form of semi-enclosed areas (Source: Aga Khan Award for Architecture)

### Key Spatial Design Features

The Wadi Hanifa region includes large industrialized farms, date palm plantations, two significant archaeological sites, and Bedouin villages along its length and it played a vital role in the establishment of Riyadh as a center for trade and travel in the desert (Moriyama & Teshima Planners, nd). Today, the newly restored Wadi (river valley) acts as a backbone, which articulates a series of linear landscapes and curates the natural and constructed flow of water creating productive landscapes and public spaces. Through a series of operations of remediation and regeneration, the project implements efficient and ecological water recycling while creating new public spaces, reconnecting citizens with the activities and leisure spaces of the life-giving Wadi (Figure 14).

With its very large length and scope, the project integrates multiple scales of design interventions, from master planning to landscape, and from architecture to signage and urban furniture. Described as an “eco-driven strategy” the project combines schemes to enhance natural processes of landscape evolution, highly engineered Bio-remediation facilities and quality-designed public spaces (Samhouri, 2010). The programmatic and functional landscapes of the Wadi features historic areas, wildlife reserves, parks, land art, environmental installations, bridges and circulation hubs, natural and man-made lakes, agricultural land, and plant nurseries.

To create the new landscapes, 30,000 indigenous shade trees, 6,000 date palms, 50,000 shrubs and groundcovers, were planted, and 2,000 large native Acacia trees were transplanted. Landscaping cells of indigenous species of flora that occur naturally in the Wadi were planted to initiate a natural regeneration process through their spreading and a Wadi plant nursery will be used as a resource to further enhance the Wadi and to supply trees and plants to other ADA projects throughout Riyadh. The project also aims to reintroduce animals indigenous to Saudi Arabia into some areas of the Wadi.
Public amenity spaces provide prayer areas and other services and catering outlets, with play and recreation areas for children. An educational and visitors center is planned within the Wadi’s boundary. This center will focus on the educational and social aspect of the Wadi by using videos and interactive features to show how important the Wadi is and has been to the city of Riyadh. 9 major parks were created, with 5 lakes for a total surface area of 25.1 hectares, 7.4 km pedestrian promenades, and 46.8 km of recreational trails created.

In the city of Riyadh, the recreational facilities were combined with habitat enhancement and water quality infrastructure such as natural stone weirs to create a habitat for microorganisms and increase oxygen levels to reduce chloroform bacteria. The large bio-remediation facility is a one of a kind design, which recreates a complex habitat, in turn treating the city and river water naturally. Downstream large Periphyton Benthic Substrate Devices (APBS) have been installed, which have given way to an underwater habitat.

Figure 14. The Wadi Hanifa project successful in providing water treatment while creating a one-of-a-kind natural facility and open-space public attraction (Source: Aga Khan Award for Architecture)

OVERVIEW OF ACCESSIBILITY, USE, AND ACTIVITIES

The analysis of the key aspects of how each landscape typology aims at achieving specific objectives while being accessible and connected to its larger context, and generating multiple types of use and activities, reveals that the three typologies presented contribute in various degrees to their physical context and their users.

Accessibility and Connectivity

The Doha Bay offers the best scenic amenity of the city with continuous pedestrian connection from the south to the north providing views of the city from the traditional to the modern. However, the Corniche landscape is not well connected to the surroundings or served by public transport. Therefore, access is only by car along the Al Corniche road, which has dense traffic at peak times and weekends. Safe, pedestrian linkages need to be defined strategically
along its entire length leading to other important open spaces of the city and connected to important transport nodes. A metro and light rail system is now being implemented, with a major Light Rail station under the Sheraton Park and others planned along the Corniche. Cycling paths and networks are also planned, which should help to make the Corniche and open spaces more accessible. Therefore, it is expected that Corniche will be better served by public transport in several points along its path. There have also been proposals to bury the Corniche road in order to have a continuity of the open spaces with West Bay and the historic center.

The Al-Azhar Park represents a different case where it appears to be an enclave development since it has fences and nominal entrance fee and therefore not accessible to everyone in the city. Yet, the inclusion of a restoration and development project in the adjacent Darb Al Ahmar district makes it relevant to the immediate socio-spatial context. It is noted that the park is located on major vehicular road, which can be perceived as an interface between the formal planned city and the informal segment of the city. The major and secondary pedestrian spines together with branched off green spaces lead to the main developments within the park including the hilltop restaurant and lakeside café. Referring to an earlier empirical study certain aspects of accessibility and connectivity within the park can be elucidated (Salama, 2008). Responding to the way in which visitors find their way around the park, 30% of 184 respondents to a survey questionnaire stated it is difficult for them to find their way and/or to know their position within, while 10% and 50% mentioned it is very easy or easy respectively. These responses relate to how they value the design of signs and the signage system as 33% valued signage as 'bad' while 36% as 'fair.' Some of the comments stated by those who valued signage and sign design as 'bad' included one or more of the following reasons (Figure 15):

- The only visible sign in lakeside café area was inside the café but there are no maps or signs near its entrance
- There is a need to have 'you are here' maps
- Size of lettering is small compared to the size of some signs
- Because lettering is too small we do not rely on the signs
- The problem is at night where signs are not easily seen
- We started to become familiar with the park after our first visit, but first time we came we were confused
- Signs are not well distributed in the park
- While signs are neatly designed they do not satisfy their purpose

Assessing the lights and lighting system by the users, it is noticed that 'excellent,' 'good,' and 'fair' are equally valued by the respondents where 20% is given to each of these qualities. However, 35% appear not satisfied with lights as a major design aspect and have commented one or more of the following reasons (Figure 16):

- Lights are not good, especially near steps and water channels
- The level of lighting in most cases, especially in lighting posts, is at the eye level which is disturbing
- The areas behind the lakeside Café and the side of the hilltop Restaurant are not well lit
- You can see the source of lights only, not the surroundings
- Lights block vision; you feel they are in the way of viewing the whole location
- Some places are scary as they are completely dark

In the Wadi Hanifa, around 50 kilometers of walking trails running throughout the entire park system serve for sports and wellness, and also as soft mobility and pedestrian links between for the public landscapes, and are also complemented by a series of pedestrian promenades and interpretive trails. These are served and accessed by new parking spaces located along the
length of the Wadi. The branding’ of the Wadi is achieved through elaborate signage including way-finding and interpretive signage and is enhanced by street lighting and trail lighting systems for the entire Wadi. The way that the vehicular circulation system has been designed and implemented, and the strict codes of conduct in the Wadi, both contribute to the family-friendly atmosphere in the Wadi. In addition, the signage system, with its well thought-out banners, educate and encourage people to act responsibly towards the environment of the Wadi, and contribute to giving them a sense of being actively involved, and an acute sense of ownership.

Users and Activities
The Corniche attracts a diverse crowd, from the early morning until late evening, strolling, walking and running. In the morning, it is popular for jogging, while late at night; it shows a different cultural view of the city. During the day, workers from the surrounding construction sites in West Bay can be seen sitting in the shade, resting or eating their lunch. The Corniche has also become a meeting place for a new generation of Qataris. Qatari rebels also congregate in the area, with motorcyclists and other non-traditional looking youngsters meeting in the area to meet up or make noise. There are also a number of seasonal and temporary activities, which include open-air exhibitions, Jet Ski Competitions, the National Day Parade and Dhow Parade on December 18th every year.

A recent behavioral mapping study of a space, near the planned Sheraton Park, as one of the key spaces along the Corniche elucidates the reality of use and activities (Figures 19 and 20) and how it is actually used by a wide spectrum of people of different age groups and from different ethnic backgrounds (Salama, Khalfani, and Al-Maimani, 2013). The space caters more to lower and middle-income groups. A strong presence of male visitors is evident on weekday evenings; male laborers working in the space are also represented, these include cafeteria staff and Msheireb Enrichment Centre (MEC) security staff. Both males and females, taking exercise in the form of jogging, or casually strolling, were also recorded as passers-by. Additionally, the children’s playground at the far northern end of the site is a major attraction for families. Family groups were also observed gathering in the space around the cafeteria, both in front of and
behind it: in fact, the cafeteria appears to be the major attraction to the space, especially in the evenings when people come for refreshments.

The space is generally crowded with different types of users on weekdays; at weekends they proliferate in the early morning and early evening. However, fewer users were noted on weekday mornings, probably due to the fact that most people are at work. In contrast, maintenance workers and gardeners were strongly represented in the mornings when they are on duty during hours where they are less likely to disturb visitors. It was also noted that a considerable number of male users visited the space specifically to drink traditional tea (karak) while sitting individually or in groups along the seawall, a protective barrier separating the promenade from the sea, chatting and seemingly enjoying the views of the cityscape or the other side of the bay. Interestingly, motorbike riders (a very small interest group in the Doha population) were frequently noted congregating at the drop-off area, near the car park.

Many users also passed by the major sidewalk or pavement, which runs parallel to the promenade, the major pedestrian spine that links the whole waterfront space of the Corniche Waterfront Park. The major activities appeared to be walking or stopping to use the rental bikes available in the green space near the cafeteria. Families were observed searching for a pleasant shady spot under a big tree, particularly near the children’s play area, a space which is dotted with small trees on landscaped artificial hills and hummocks. Casual observation at other times, apart from scheduled behavior mapping times, records that the space is more vibrant and more heavily populated during special events such as Qatar National Day celebrations and water sport events and competitions. While overall adults and children seem to enjoy spending their time there, pursuing their recreational interests and activities, the space lacks sufficient outdoor seating and significantly lacks parasols or other forms of shade, which could potentially make it more appealing for use by more groups, especially during the hot and sunny daytime hours.

![Figure 19. Individuals and groups congregate on pavements and green spaces at the mapped area (Source: Salama et al., 2013)](image-url)
The Wadi Hanifa along its length is used for multiple productive and recreational activities including agriculture, leisure, tourism and water management. Its functions for water management include a channel system that biologically remediates wastewater as it flows along the channels and the major Bio-remediation Facility that also collects data and monitors the water quality. The seven major public landmark parks (with additional two under construction) along the Wadi are used as important leisure and tourism spaces for the permanent and visiting population of Riyadh. Around 50 kilometers of walking trails running throughout the entire park system serve for sports and wellness, and also as soft mobility and pedestrian links between for the public landscapes, and are also complemented by a series of pedestrian promenades. As the Wadi is becoming visibly green and the water increasingly clean, the people of Riyadh have started using the Wadi parks and open spaces in large numbers as evidenced by the almost full capacity crowds on weekends. The Bio-remediation Facility is doing the work of cleaning the water and it is performing beyond expectations.

The parks are designed in a way that provides family compartments, in the form of semi-enclosed areas, which each family can use for the day, without being disturbed by neighboring families. The authorities provide clean toilet facilities, running water, medical points, an active
ranger patrol service for help and security, and operate in coordination with the city’s fire and police departments. Maintenance and management of the Wadi is underway and will continue to enhance the entire length of the Wadi.

ANALYTICAL REFLECTIONS:
CAN CONTEMPORARY LANDSCAPES CONTRIBUTE TO THE CREATION OF KEY SUSTAINABLE URBAN QUALITIES IN MIDDLE EASTERN CITIES?

Contemporary urban research on sustainability often focuses on environmental concerns by exploring more efficient urban structures as well as technologies to reduce energy waste. However, in addition to ecological balance the sustainability of urban environments is highly dependent on economic growth and social equity. Holistic sustainability in an urban context can thus only be achieved if social, economic and environmental aspects are understood in relation to each other (Salama, 2007). In this respect, the unique features of each landscape typology have the potential of creating specific sustainable urban qualities. In essence, this reflects the multidimensional aspects of those typologies. While there are positive characteristics that enable each typology to contribute to city sustainability, there are drawbacks that should be highlighted.

In the case of the Corniche of Doha different types of palm tree and grass which overall scenic landscape, line the central spine of the roadway. Sweet water, from desalination, is used for hygienic reasons, as the lawn turf is used by children. A large amount of water is used in the hot months due to evaporation. There are currently two types of irrigation systems and water supply to parks, gardens and open spaces: one is potable (sweet) water supply system from desalination plants used for irrigation of the parks and gardens, the other is treated sewage effluent, which is used mainly in roadside areas and roundabouts, not for public parks and green areas in schools and hospitals. In social terms, the Corniche can be seen as the only public space in the city where people from different socio-economic strata and cultural backgrounds have access to all parts of it. It must be noted, however, that the Corniche in not actually designated as a park or green space in the official maps and documents (MMUP, 2010). Therefore, it is not part of an overall landscape master plan for the city. Thus, surrounding parks are not well networked, and overall, Doha does not have a connected green network of public spaces and parks. Despite the relative success at the social and urban diversity level, physical aspects related to access and connectivity present important challenges to effective and efficient use. These need to be considered as integral components of immediate plans undertaken by MMUP-Ministry of Municipality and Urban Planning. In addition to inefficient access and connectivity, many of the spaces and gardens lack sufficient outdoor seating and significantly lack parasols or other forms of shade, which could potentially enhance its use and social role within the city.

Unlike the Doha’s Corniche and due to their scope, The Al-Azhar Park and Wadi-Hanifa Wetlands appear to address the larger matrix of sustainable urban qualities, while involving multi-dimensionality in scope and interventions. The Al-Azhar Park project was therefore intended to be a case study for a variety of development challenges, ranging from environmental rehabilitation to cultural restoration. The objective was to create models of development that could be replicated in many other settings, and in particular in the historic cities of the Islamic world. Almost one-third of historic cities on UNESCO’s list of world heritage sites are in the Islamic World. Many face pressures similar to those of Cairo (AKTC, 2001). In addition to the unique design features that the Park enjoys, most features of the Park were based on the traditional use of public spaces in Islamic contexts. This is reflected in the bustan-like orchard spaces, the shaded sitting areas (takhtaboush) and the Fatimid archways used in the construction of Park buildings, among other elements. Persian and Timurid elements are also reflected in the water channels and fountains. At the environmental sustainability level, the Park
utilizes an efficient irrigation system, providing water through drippers and sprinklers. The irrigation is regulated by a special weather station, which calculates the water needs based on temperature, humidity and wind speed.

At the socio-cultural sustainability level, a large-scale archaeological conservation task was initiated. This includes the restoration of a 1.5 kilometer stretch of the eastern Ayyubid wall. The neighborhood of Darb al-Ahmar is one of the poorest and most populous areas of Cairo, lacking adequate sanitation and rubbish-collection services, with refuse often piled up in the streets and in courtyards. Faced with low rents, absentee landlords invested little or nothing in their buildings, with predictable results: roofs and walls collapsed, the historic monuments came under greater and greater stress, and expectations for the quality of life declined along with physical decay. Yet community and family life remained strong. Small family businesses, including carpentry, tile making, and other small crafts, continued to provide a portion of the local population with a living (Siravo, 2001).

Extending beyond the environmental and socio-cultural dimensions, the project for socio-economic development of the adjacent neighborhood was conceived with the idea that the removal of the former rubble dump and its metamorphosis into a park would have a catalytic effect on the general improvement of the district. However, to ensure this result, the project’s scope had to encompass the cultural monuments in the neighborhood and the people of this area. This approach took the form of an integrated urban area development plan containing a series of pilot interventions aimed not only at the restoration of landmark buildings, but at wide-based socioeconomic development.

As well, the project addressed training and employment issues where many of the skills-training programs have been implemented in conjunction with restoration and rehabilitation interventions on the Ayyubid Wall or in restoration projects in the district. Specifically, building tradesmen (masons, carpenters, plumbers and electricians) have been given product quality training. Apprenticeships offered to local youth in connection with stone masonry and carpentry, among other trades, are also integral parts of the program. Other apprenticeships with local businesses have been arranged, through a stipend system, in the fields of computers, mobile phone services, automobile electronics, office skills, and furniture making and tourist market goods.

Training has been offered by local master craftsmen and technicians as well as a handful of foreign experts. The project has offered over 120 training positions in activities such as stone carving, masonry work and materials conservation (Bianca, 2001).

Notably, an integrated urban development in Darb al-Ahmar, with duration of four years, was started in January 2004. During this second phase, rehabilitation and restoration of a substantial number of houses is implemented, as is open space improvement. The existing credit program was expanded to stimulate entrepreneurship and increase levels of income for the area. Provision of basic social services including health, education and solid waste disposal were be addressed in collaboration with local institutions active in these sectors and by strengthening their organizational and institutional capacities. The successful employment scheme started during the first phase will be continued and expanded. Other than the socio-economic program for Darb al-Ahmar, the construction of a hotel and urban plaza with a large car park, recently begun at the northern edge of the site, will also give direct economic stimulus to the district (AKTC, 2001).

The fact that most planning and design aspects of the park were satisfactory to, —and in some cases were praised by—the users is an indicator of the degree of the project success. As well, the results of the interview questionnaire (Salama, 2008, 2014), which reveal that a considerable number of users praised a wide spectrum of features through their reactions and responses, are evidence that the project is successful and deserves such recognition it has received in the specialized and public media. Nevertheless, the lighting and wayfinding systems appear to have been compromised based on the users’ reactions. While some may claim that no
planning or design outcome is completely perfect and is satisfying everyone, one should assert that a project of this scale, magnitude, and amount of recognition is not expected to have these influential aspects as major sources of dissatisfaction.

The notion of multi-dimensionality is evident in the Wadi Hanifa Wetlands project as it contributes to three types of urban qualities. The question of developing large territories that address environmental needs is emerging to show how, through careful planning, livable environments can be created. The project, which has received one of the Aga Khan Awards in 2010, responds to this question. It proposes a green, safe and healthy environment while providing continuous parkland that connects the wadi to the city of Riyadh—capital of Saudi Arabia. Integrating residential development, farming, recreation, and cultural activities, a man made oasis was created. In essence, the project’s ecological strategy incorporates a wide range of architectural interventions: from master planning to landscaping and from building to signage and urban furniture.

At the environmental level, the government invested over $100 million (US) into an environmental rehabilitation project which the construction of dams to regulate water flow, new limits on land use such as the banning of such commercial activities as quarrying, and the planting of reeds to further purify the treated and untreated sewage. Rather than the using more traditional techniques the design team proposed to improve the water quality in the lower reaches of the Wadi using bioremediation techniques thus increasing the amount of water available to 120,000m3 of water per day for irrigation, agriculture and other non-potable uses, which could potentially increase to 1,000,000m3 per day by 2025. Storm water management was also an important part of the infrastructure, and side water inlets have been reclaimed or added to aid in flood control and habitation.

Integrating the environmental dimension with the socio-cultural one, the project has a very important educational component, which is progressively being enhanced. The rich diversity of flora and fauna found in the vast natural areas of the Wadi is very attractive to school programs and scientific experiments, from elementary level to university level. The Bio-remediation Facility with its large scale, cutting edge technology and informational signage is a very attractive scientific experimentation facility and it is frequently visited by schools. The ADA also has plans for engaging the general public by installing (by 2011) a cable car system that circles the area of the facility with audio presentations explaining the way it is operated and the importance of reusing surplus water (Bodeker, 2001). Looking at the jury citation on Wadi Hanifa, the true merits of the project can be revealed, “The project reverses the tide of rapid urban development, which has seen public space in many cities within the Muslim world fall victim of expropriation and other practices that deprive the population of its resources.” This tells us much about the way in which the project offered an inclusive public space for the inhabitants of the city of Riyadh. In addition to the overarching concern for the environment, the premise of the project, in adopting the notion of providing ecological infrastructure and experiencing the spatial qualities of the environment, is evident in the jury citation “Using landscape as an ecological infrastructure, the project has restored and enhanced natural systems’ capacity to provide multiple services, including cleaning the contaminated water, mediating the natural forces of flood, providing habitats for biodiversity, and creating opportunities for educational and aesthetic experiences.”

Wadi Hanifa Wetlands project is increasingly becoming recognized in Saudi Arabia and around the world as a landmark initiative. The economic dimension is manifested in the idea of a ‘living valley’ or ‘living Wadi’ brought back to health, sustainability and fully integrated into the life of the city of Riyadh. It has generated a series of investment opportunities along the continuous ribbon of naturalized parkland that interconnects and interfaces city and Wadi, in which residential development, farming, recreation, cultural activities and tourism exist in harmony within an oasis that extends the full length of Riyadh, and beyond, into the surrounding rural areas. A unique feature is that the Wadi is planned and designed to continue developing and...
growing according to the natural processes that have been allowed to reclaim their grip, in addition to man-made interventions providing open spaces and parklands along the Wadi and extending them into surrounding residential areas (Samhouri, 2010). A combination of public and private investments in cultural, agricultural, tourism, recreational and leisure and mixed-use facilities offers a sound and sustainable economic model.

Despite addressing the three pillars of urban sustainability, the Wadi as a whole is an exclusively governmental project that does not engage the private sector. The fact that the Wadi looks very clean and neat might be seen as a negative aspect where human use cannot be traced, it lacks the necessary support facilities including restaurants, small vendors, kiosks, and the like. The types of functions have the potential of enhancing the Wadi’s contribution to economic sustainability.

CONCLUDING REMARKS

This chapter discussed the multidimensional aspect of contemporary landscape in Middle Eastern Cities. It critically analyzed the notion of how landscape and park projects contribute to the shaping of their immediate context while addressing key sustainable urban qualities. The chapter identified three types of contribution of contemporary landscapes – edge, center, and spine. Yet, The objective was not to compare between the three types but rather analyzes different types of contribution of each landscape typology. Notably, they range from the linear coastal landscape that, to the central park that reactivates or regenerates a fragment of the city and its communities, to the landscape of ecological infrastructure that articulates and curates the natural and constructed flow of water creating productive landscapes and public spaces. Metaphorically, the three types represent different types of interfaces. Doha’s Corniche acts as an interface between the city and the sea, the Al-Azhar Park acts as an interface between the formal and informal segments of the city, while Wadi Hanifa represents a different type of interface between the agricultural plains and the urban center. The three landscape typologies present contemporary projects in different geographies of the Middle East, their analyses reflect the multi-dimensional notion of landscape.

The analysis and classification of the three projects into three topical areas that included contextual background, evolutionary design and planning aspects, and key spatial design features, revealed the premise and thrust of each. While Doha Corniche symbolizes the city as its landmark and is typically perceived as a center despite its geographical location at the edge, Al-Azhar Park and Wadi Hanifa Wetlands projects involve a deeper discourse into the role of landscape in shaping the physical environment and the society within.

The fact that each intervention supports its socio-spatial context makes them serious contributions to their cities and to the creation and achievement of sustainable urban qualities. On the one hand, while Doha’s Corniche successfully addresses the socio-cultural dimension through diverse types of physical activities performed by people of different cultural and socio-economic backgrounds, key design aspects such as support functions, services, and urban furniture, are insufficient. The economic and environmental dimensions appear to be out of the scope as it stands now. However, the proposed schemes are expected to underscore those dimensions. On the other hand, despite minor drawbacks found in the Al-Azhar and Wadi Hanifa Wetlands projects, manifested in the Al-Azhar Park users’ dissatisfaction of the lighting and signage system and the absence of the private sector role in the Wadi Hanifa, they clearly translate their physical presence within their context into multi-dimensional contributions addressing the interdependent variables of sustainable urban qualities, while offering lessons that can be replicated in future landscape interventions in Middle Eastern cities.
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THE CITY BUILT IN ELEMENTARY PARTS: AN ALTERNATIVE TO DELIRIUM OF POST-METROPOLIS

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Abstract
Starting from Italy and from the book Manifesto del Nuovo Realismo (2012) by the philosopher Maurizio Ferraris, a new paradigm was created: a critical return to “strong thought” opposite to the previous post-modern paradigm. What about Architecture? The paper studies the reflection developed through a series of conferences and exhibitions, held over last three years, inviting architects and philosophers – Italian and foreign – to think over “Architecture and Realism”. Starting from an initial assessment of these initiatives, the need to improve tie of our discipline – Architecture – with reality emerged; a reality that we have to properly understand with the aim – remembering Lukács – of building «a real and adequate space, able to visually evoke adequacy» and, in this way, counteracting the senselessness of contemporary architecture as ‘reductio ad imaginem’ and the amorphous growth of globalized post-metropolis. As the authors believe that circularity between Theory and Practice exists in Architecture, some projects at the urban scale are given to clarify theoretical affirmations in the text.

Keywords: new realism; architecture of the city; architecture and philosophy; contemporary city

INTRODUCTION

Architecture, city, reality are three words – central in the reasoning of this essay – that are apparently not subject to interpretation, nevertheless it is useful to try to define them, from a specific and explicit point of view.

Architecture is, as in Gregotti’s definition, a practice of art with the ultimate aim of the construction of spaces for human habitation: an inhabiting intended not in individual sense but collectively. Architecture establishes a circular process with society, through the architect: society requires architecture and accepts (or rejects) the answers. In this, Architecture is equidistant from both pure art and mere technique; it exists to answer to collective rather than to individual requirements and to build real and adequate spaces for people; in this sense it does not develop through subsequent overruns but through progressive accumulation. The city is the concrete evidence of this; it is the place where all our history becomes the critical and living scenery that occurs in order that architecture may be an expression of its time but also of dialectic continuity with the past. A city that should always be, for the architects, a reality of forms, measures, materials, colours. From this disciplinary point of view – recalling its autonomy – the project is responsible for the knowledge of reality – of forms, measures, materials and colours – for its critical interpretation and positive modification. On the other hand, if Architecture is unavoidably linked to reality, there is Philosophy: a field of study able to ask more than answer. Nevertheless, Architecture and Philosophy have had frequent opportunities to meet, with different results and today we are reasoning about the relationship between New Realism and Architecture of the City.
There is an image that is representative of this relationship: the Scuola di Atene by Raffaello Sanzio. The main character of this fresco is Philosophy through philosophers but there is a co-character: Architecture here represented by the architectural space, probably the unrealized project for St.Peter’s Basilica in Rome by Donato Bramante. In the fresco both disciplines are in symbiosis: if Philosophy is the intellectual activity of world and life understanding, Architecture has the difficult task of reify it – and all other human activities – turning it into spaces in the city and buildings where man, as a collective and not individual entity, may still be able to live, represent and recognize himself.

This essay aims to define the “state-of-art” of the debate of “New Realism” inaugurated by the philosopher Ferraris’s book Manifesto del Nuovo Realismo (2012). Moreover, the text defines a theoretical position that a certain number of architects propose in opposition to an idea of Architecture that has lost the relationship with reality. This position is linked to the Theory elaborated within the Italian architectural debate of the sixties and the seventies of the twentieth century and wants to re-actualize it, focusing on the city as place where the History has settled and where Tradition – that is the living part of the history – represents itself.

Figure 1. Scuola di Atene, fresco by Raffaello Sanzio, Musei Vaticani, Rome, 1509-1511

CITY, BIG-CITY, METROPOLIS, POST-METROPOLIS, CONTEMPORARY NO-CITY:
ARCHITECTURAL AND PHILOSOPHICAL CONCEPTS

The transition from the big city (still definable) to the metropolis (immeasurable and for this reason unknowable) is similar to the passage in philosophy from the ‘modern’ condition to postmodern. The Grand récit (Lyotard, 1979) of tradition are abandoned and the metropolis intentionally renounces order (côsmos) and pursues disorder (câos). The metropolis – in Cacciari’s theory (Cacciari, 2004) – from pólis becomes urbs or rather civitas augescens (sine ullo limite): the pólis was based on the ghênos, on the community, and contained the idea of péras, limit/boundary, of nomos as ‘rule’. In opposition, urbs is defined by its administrative laws and, in this way, contains the possibility of an endless growth (a-péiron); it de-lira (exceeds its limits), comes out of the furrow, of the lira (the fence that enclosed the city) that is the sacral ‘limit’
at the city gates.

The philosopher Maurizio Ferraris confirming this interpretation states: «the postmodern aesthetics is [exactly] aesthetics of metropolis» (Ferraris, 1983). In some ways the ‘modern’ philosophical constructions (Heidegger-Benjamin-Weber) were still linked to an idea of pólis where the relationship between ‘artificial interior’ and surrounding ‘external nature’ was clear. The city-pólis (culture) – according to Ferraris – is opposite to nature (chora) that surrounds and delineates it; it is a circumscribed, definable and recognizable place, a “isolated artifice” in a natural territory as in the Allegoria ed Effetti del Buono e del Cattivo Governo by Ambrogio Lorenzetti.

Conversely, in the late modern age, metropolis is not simply an extension of the city. The metropolis does not oppose itself to the natural exterior but radically abolishes any references to Nature [as the Enlightenment stated], to origin [founded/foundation, Grund]; it states the triumph of Culture, of entities, of technologies and Technique such as ‘desire of power’; it refers [ – in the Being oblivion — ] simply to itself, is comprehensive and boundless without gaps» (Ferraris, 1983). The metropolis/megalopolis – even if descending from méter-pólis – has no longer the sense of a ‘generated’ city by a mother-city but is free from the specific characteristics of the territories that it invades and, as in Heidegger, is ‘building’ without ‘dwelling’ and thus without ‘thinking’. The metropolis, well described by Derrida (Ferraris, 2010) and Deleuze, connects with and interlinks to – but is never in relationship with – other metropoli that, sooner or later, is going to reach with its ‘agglutinative growth’. As Ferraris adds: it is difficult to understand the complexity of Culture [if it has not already become Halbbildung (Adorno, 1959)] when the Nature as a reference disappeared (Ferraris, 1983); in this way, the city is reduced to an event, to performance. In the metropolis of sprawl the necessary relationship between houses/work places/public spaces is replaced by a relationship between individual (villas) or collective (condominiums) houses and places no longer for humans but for consumers (hypermarkets, shopping malls etc.). Today the globalized metropolis has lost its identifiable places and is a sum of ‘impermeable enclosures'; its centres of public and collective representation are lost in the sprawl of public spaces (Monestiroli, 1994) that are always the same at all latitudes. All contemporary metropoli have everywhere becomes a ‘non-places’ (Augè, 1992). The contemporary non-city is a confused deposit of individualism, congestion, and indiscriminate soil consumption and ‘envy of the centre’ (Stellario d’Angiolini, 2004). The ‘urban sprawl’ is the hypostasis of repetition and becomes, renouncing to critical differences between beings and entities, a mere representation, aesthetics of simulacrum (Baudrillard, 1980). The rampant explosion of the contemporary megalopoli – e.g. in the Far East or South America – causes urban experiences based on ‘distracted’ movement, bigness and immensurability: a nomadic post-city where «nothing is worth remembering» but only fast consumption up to Koolhaas’ Junkspace. In the unlimited sprawling space there is no possibility of recognition. It is not the
'urban-rural diffused city' evoked by Agostino Renna in the book *L’illusione e i cristalli* (Renna, 1980) where there was an important relationship between land design, its rules and signs, its skilful use and precise utilization: the contemporary city is only undifferentiated *continuum* of sensitive experiences, of extravagancy and sensorial aggression without materiality where everything overflows into virtual images (Maldonado, 1992). In this framework the individual (*mònade*) prevails over the community. In order to solve and overcome this de-realized condition the ‘weak’ answers by Baudrillard (1980) or Vattimo (Vattimo-Rovatti, 1987) that echo the ‘cheerful wandering’ by Tafuri (Tafuri, 1986) are not enough: a wandering around big outlets in an absolute, physical and physiological disorientation.

**NEW PARADIGM IN PHILOSOPHY: NEW REALISM**

The latest debate on New-realism in the philosophical field could today be a point of reference for a new paradigm in architecture: a critical return to “strong thought” opposed to the previous post-modern paradigm (Bauman, 2011) and able to counteract the senselessness of contemporary architecture as *reductio ad imaginem* and the amorphous growth of globalized post-metropolis. Unlike Nietzsche’s assertion «there are no facts, only interpretations», New-realism states that *real objects* are different from *social objects*: the facts exist and mankind must deal with them (Ferraris, 2012); reality is a social entity and always controllable; the truth is not a useless notion. Starting with the critique of the post-modern idea and its outcome, New-realism proposes a reality as an unalterable fact and intends to defeat the media populism of our age and to find a positive answer to the crisis, not only economic but also that of values.

*Figure 3. Architecture and Realism* (Left) Conference in Naples (Right) Conference in Turin
Regarding current condition of architecture and its effects on the concrete and physical transformation of cities and territory, the theme of the relationship with reality is relevant. In 2012 and 2013, a group of young teachers and researchers organized a series of conferences and exhibitions, inviting architects and philosophers – Italian and foreign – to consider “Architecture and Realism”.

Starting with an initial assessment of these initiatives (Malcovati, Visconti, Caja, Capozzi, Fusco, 2013) (Malcovati, Suriano, Caja, 2013), the need to improve tie of our discipline – architecture – with reality emerged; a reality that we have to properly understand with the aim – remembering Lukács – of building «a real and adequate space, able to visually evoke adequacy» (Lukács, 1970). The research of adequacy (vs. acceptance), correspondence and suitability of forms can produce again the social utility of our work, not moving from an uncritical acknowledgment of the status quo (Gregotti, 2008), but from the conviction that a progressive transformation/modification of our unfortunate condition is possible. Following this new idea, Architecture is no longer the production of marketable goods and cannot virtualize itself under the pressure of an incessant production of idola, where the representation of community values is hampered by an overcrowded and unconscious homogenization, where the individual prevails over the collective and this “city without citizenship” is reduced to an indistinct agglomeration without identity. Through a new relationship with reality, it is possible to reflect on the practice of our work and the “reality” of architecture, to think critically about the positive instances that architecture – as a constitutive part of our physical, social and economic reality – contains for the transformation of cities and the territories in which we live. Therefore, realism in architecture should be a reminder to the civic responsibility of a project, related to its concrete effects on the physical and material transformation that it produces. Overcoming the static relativism of these years, the mistrust and rejection of any possible objective foundations and returning to the “things themselves”, the basic rules and its permanent tradition, Architecture could once again be able to determine and influence, as few other human activities, our dwelling in terms of longue durée.

In this relationship to philosophical realism, there is no idea of subordination of Architecture to Philosophy but rather – opening to comparison and new possible reflections and progress – a re-appropriation, from the point of view of an autonomous architectural reflection, of an ancient, inbuilt and unavoidable critical relationship with reality: architecture is a discipline that has the responsibility/purpose of environmental modification but it cannot be simply “reflective”; it must be “forming”, each time updated in its essential values and civic contents.

CONCLUSIONS
What about Architecture? Is it possible a “translation” of the New Realism as paradigm of theoretical thought in an architectural paradigm? What kind of concrete way of designing buildings and cities is possible to relate to this paradigm?

New Paradigm in Architecture: the City Built in Elementary Parts
Referring to an “idea of city” means ultimately discussing the ‘form’ of the settlement, the general order of urban construction. In other words, this means reflecting on the underlying structure, the notions of urban fabric, main or recurring elements and on the theme of the overall configuration of the city. Throughout human history, every age has expressed and built its idea of city through solid principles that describe its features of universality and intelligibility. Despite this generality, the possible declensions and applications were highly varied. Each city establishes a particular relationship with places, with ‘inertias of reality’; in every city, while a general idea is rationally expressed, there is a feature of individuality connected with physical reality and influences of the places which it builds every time. In any case, cities and the underlying ideas (eidôs) are, as Lévi-Strauss states, «human construction par excellence»: the most complex and full of values.
What is the possible idea and form of the contemporary city? Can we accept the idea of a city without form as representative of our age? A rational, responsible and realistic approach should only oppose the current “loss of form” (Calvino, 1975), of fundament, this delirium/metastasis that is eroding and consuming our territory, deleting its structures, identities and renouncing to its possible reformulation and rationalization. Following a new, architectural realism, fragments alluding to a ‘possible order’ are still identifiable even if it is not possible to define, in the contemporary age, an overall *forma Urbis*. It is probably possible to once again start with the effort of re-funding of the Modern Movement – as Monestiroli said in the essay *L’arte di costruire la città* (Monestiroli, 1994) – that remains an ‘unfinished project’ (Habermas, 1980). We can look at the American experience of Hilberseimer and Mies in Lafayette Park in Detroit, to the *Quartal* (urban sectors) by May in URSS, the Plan of Chandigarh by Le Corbusier and some projects for residential units by Adalberto Libera (e.g. *Quartiere INCIS* in Rome): theoretical models and examples – not a *panacea* – from which we can start to find, in the contemporary city, ‘parts of city’ where a ‘conscious society’ can still identify itself. These ‘parts’ could represent a compliant and repeatable unit of the city, based on a mix of different residential typologies, open spaces and collective buildings. It is then possible to combine and iterate the units through different procedures of urban composition: repetition/variation, overturning/symmetry. However, this is not an undifferentiated or isotropic repetition: it is governed by intervals produced by nature-voids for public facilities, in a relationship figure/background where the emptiness prevails on the built spaces in the general construction of the territory. The location of ‘new centralities’ – along the most important infrastructural systems – can represent the recognizable ‘breaks’ in the controlled repetition of residence. Therefore, a ‘polycentric city’ (Monestiroli, 1995), a territorial construction where the context and the reference is again Nature (Monestiroli, 2002), where construction of ‘elementary parts’ (Aymonino, 1975) is related to a whole (*Hōlos*) or, at least, aspires to compose an ‘intelligible mosaic’ where all the unavoidable ‘constraints’ are always critically interpreted (Adorno, 1959 and 1979). A city able to interpret the geographical and morphological singularities and the new multi-scale dimensions of the “city-region”; a ‘balanced’ city where the different parts are not only in material and/or immaterial connections (*links*) but in formal and syntactic relationship (*ratio*) (Rossi, 1960-1961) where the ‘void between the objects’ is once again a ‘topological field’ in relation to distance – an open space that is an orderly structure to be revealed and interpreted each time – where the buildings ‘happen’, where the controlled metrics, the dimensions, the problems and the general complexity change. A ‘desirable’ city where the confused ‘forest’ becomes ‘a clearing’, able to refer to a collective construction of the «fixed scene for human life» (Rossi, 1966), a place once again to know and explain the world. Only in this way we can again find, in the modern city, the forgotten civic values and those «silent and spacious, wide-range places for reflection, places with long high galleries to shelter from the bad weather or from too much sun, where the noise of carriages and barkers cannot enter and where the finest sense of education would even prohibit the priest from praying aloud: buildings and public gardens that can express the sublimity of meditation and being alone» (Nietzsche, 1882).

**From Theory to Practice: Projects for Contemporary Cities**

Some project experiences at an urban scale are useful to clarify our theoretical affirmations. The following projects, at different scales and in different geographical contexts, show the same point of view on the construction of the contemporary city that, according to what is mentioned above as *new realism* and *architecture of the city*, believes in a concrete chance of the positive transformation and improvement of urban realities.

The first case study concerns research activity coordinated by Federica Visconti and Renato Capozzi in the Department of Architecture on the revamp of the residential, ‘modern’ districts of the twentieth century – particularly in the Naples metropolitan area – and involves researchers

The main idea of the research is that the special peri-central location of the districts under investigation could represent a significant opportunity for urban, environmental and social redevelopment not only for themselves but for the larger surrounding areas littered with spontaneous and low quality private construction, abandoned industrial areas, infrastructural systems often built in a haphazard way in relation to the layout and the values of adjoining areas. The projects intend to recognize the morphological value of the districts in the first half of the twentieth century as a strategic point: they represent recognizable finite urban parts. Moreover, they have an undoubted architectural quality in the buildings designed by Masters of Italian Rationalism which referred to the ‘idea of open city’ produced by the Modern Movement based on a renewed relationship with nature: a city where the design of open spaces and green areas contributes to define the general structure of the urban fabric. On account of the above, these districts today can be an important resource and an opportunity to rebalance formally, socially and environmentally the contemporary city. Obviously, this positive assessment cannot ignore the many problems that characterize these districts: the social and functional mono-use, the lack of facilities, poor maintenance of open spaces, extensive process of privatization as well as modest economic and social dynamics and difficulties in fundraising. The projects aims to structure, by upgrading the recognizable potentialities, a systematic set of actions to solve the current contradictions and enhance the formal and morphological values and the quality of life in these districts that are today only partially expressed. From the point of view of the Architecture of the City (morphological approach), the relevant character of these districts is, on one hand, the clearness of the urban fabric and their ‘right dimension’, together with the existing contiguous urban parts and the historical routes leading from the city centre, and, on the other hand, consequently, the offered opportunity to assume them as starting points in a process of redefinition and rationalization of the surrounding areas that today are without any clear design. These districts are very different from the public residential buildings of the Sixties-Eighties: mega-structures (e.g. the famous Vele of Scampia in the northern periphery of Naples) unable to evoke the city due to their scale, the volume in terms of inhabitants and buildings and the scattering of open spaces and thus terrain vague without measurement or character. The points of reference are rather the districts built at the beginning of the twentieth century in Europe by the Masters of the Modern Movement: in some cases projects of revamping were recently carried out (Cité Frugès in Pessac by Le Corbusier and the Kielhoek in Rotterdam by Jacobus Johannes Pieter Oud, both restored in the last decades of the past century) with significant results in terms of safeguard and improvement.

Returning to the Neapolitan case, in the eastern periphery of the city Rione Luzzatti – built in 1914-29 and today squeezed between the Central Station area and the Business District – shows a urban structure based on the repetition of the squared block and a central block intended for school facilities to serve the district. The project of a new block by Luigi Cosenza (1946-47) is an important lesson that combines modern standards for social housing (well designed orientation and mix of different typologies) and rules of urban design (the confirmation of the morphological choice of the courtyard).

The urban arrangement – even if it has a clear general design – introduced some relevant weaknesses, from a typological and morphological point of view: the decay of the buildings, the over-density, the indifference to the hygiene and to their right exposure, the lack of public spaces and facilities. The Rione, originally separated from the consolidated city, has been, over the years, gradually surrounded by public residential districts and, moreover, by the Business District that, while following the same alignments derived from the City Plans of 1939 and 1946, enlarged and amplified the scale of the buildings and roads. The research hypothesis moves from the observation of these systems that conflict with the neighbouring urban parts and suggests, on
one hand, the rationalization of the blocks (with the demolition of the buildings inside the courtyards) and, on the other hand, the identification of a compliant measure for the project able to build a new urban centrality, eco-oriented and suitable for defining the entire form of urban area.

Figure 4. Rione Luzzatti in Naples. Project by ing. Primicerio, 1914-1925

This hypothesis takes the form of a ‘complex unit’, an elementary part able, because of its role and figure, to summarize and measure the whole Rione. The unit – complex from morphological and functional (houses, facilities, tertiary and commercial spaces) point of view – forms a new arrangement, adhering to the urban-rural system of the seventeenth century with the aim and the ambition of bringing again to the area the partitions of the fields and the water channels system that were so important in the past.

In this way it is possible to reproduce nature on this site as a wider frame of reference for the contemporary city. The use of vegetation and water is a way to recreate the memory of this place and its origin as a natural area outside the consolidated city but also a way of feeling current needs in term of sustainability: in fact, the soil, the ground where the buildings are placed, is now almost completely permeable and able to reduce the “heat island” effect. The new morphological part exceeds the size of existing block and defines a new scale in the Rione: new and old elements – the courtyard block, the church as a monument, the new residential and collective buildings – become a new structure and take on a new meaning, building a new centrality able to compete on an urban and territorial scale in the whole eastern area of the city.
Once again in the eastern periphery of Naples, the project for three public buildings in Barra becomes a chance to create a wider plan of redevelopment of a social housing district, built after the Second World War by Luigi Cosenza, Carlo Coen and Francesco Della Sala. The original rationalist project was set up, as a potentially repeatable urban sector, on a central spine made up of public buildings and surrounded by residential areas.
A typological mix and a significant relationship between buildings and green areas were able to contribute to the urban fabric definition and characterized the district. But the facilities were not built and an excessive urbanization, starting from the seventies of the twentieth century, obliterated the green areas in the district and the agricultural areas adjoined. Moreover, the privatization of the collective spaces has today left the district without the qualities originally present in the idea by the architects. Starting with the original urban design but at the same time interpreting current condition, the project aims to redefine the district as a defined ‘urban part’ where a green parterre, mostly permeable, becomes the unifying element of the urban fabric and the public buildings – a school, a library and a market – define a system of relation to distance assuming, in this way, the role of primary elements in the social housing district.

Figure 7. Project for districts in Barra (Naples). Design by Francesca Addario. Supervisors: Federica Visconti and Renato Capozzi
Consequently, the district as a whole becomes a place where open spaces (nature) and buildings (culture) can dialogue and where the trees, the meadows and the pedestrian paths define the structure of the urban design. Finally, the project, acting on the confirmation of some elements of the original project – among them, in particular the central axis – working on the boundary definition that become the places of the public buildings and assuming a general plan for green areas and paths for the entire district, reconfigures the area as a recognizable ‘urban part’ where the relationships between residential buildings, public facilities, landscaping and public spaces are once again evident: a place where people can still feel at home.

Figure 8. Green areas and urban fabric for Barra (Naples). Study of the original project, present condition and project by Francesca Addario. Supervisors: Federica Visconti and Renato Capozzi
The second case study is a project proposed by Adelina Picone (team leader) for the Competition for an urban plan of a residential compound in Marcianise (Italy). The case study regards a new sustainable district in the territory of Roman centuriatio.

The district assumes the measure of the centuriatio (Roman land division) between Capua, Caserta and Marcianise and proposes a similar structure to the historical centre of the agricultural village. In this way, the project, with particular attention to the use of renewable energy, is intimately linked with the illustrious constructive and typological tradition of the courtyard house as basic elements of urban construction. The idea is that a sustainable city cannot be designed without reference to the history and identity of territory to be settled: it must interpret in a contemporary way, appropriate to the needs of life and living, the values and basic characteristics of the historical city, establishing and perpetuating the thread of continuity with the territory and environment to which it belongs. The project has its incipit and reason for its main choices in the study of the founding principles of the urban fabric in the city of Marcianise. From the study of centuriatio, in a part of the Ager Campanus, it underlines the relationships between the territorial and the urban scale, identifying the dimension of the project-area as a centuria.

Figure 9. Competition for an urban plan of a residential compound in Marcianise (Italy).
Design by Adelina Picone (team leader)
From the study of the area, the analysis identified the spatial and morphological characteristics that are derived from the plan. From the redrawing of the section of the main streets of the urban centre, it was clear that the invariant is represented by the presence of the continuous curtain and the almost constant ratio between the width of the street and the height of the buildings. This highlights the need to investigate the relationship between urban morphology and building typology: forms and measures of the blocks and prevalent building types where the courtyard, originally rural, is a characteristic of identity.

Figure 10. Competition for an urban plan of a residential compound in Marcianise (Italy). Design by Adelina Picone (team leader)
The design choices are in line with the architectural and urban principles of the primeval city centre of Marcianise, and in particular:

- the new district is enclosed by cardini and decumani of a centuria and the urban fabric is structured on an orthogonal grid that re-proposes the dimension of the historical centre of Marcianise and the traces of the agricultural division of fields;
- the streets accurately maintain the characteristics and spatial relationships with the historical city: the alignment of the facades, the continuous curtain and the conservation of the metric relation between street width and building height;
- the main open spaces and the public buildings are placed along the major decumanus that is a pedestrian path able to give an order to the whole urban fabric. The positioning of the squares is, as in the historical city, on a tangent to the axis;
- the single family house is the basic unit in the choice of the residential typologies.

The most common typologies all have open spaces and green areas, a continuous curtain along the street, more than one floor and architectural features designed in relationship with climate/form and energy strategies/formal and spatial needs; the typologies are: terraced houses on gothic blocks, terraced houses assembled in wide courtyards, terraced houses assembled in small courtyards, special flats (for the disabled, the elderly and young couples). The energy and environmental strategies in the project are, therefore, completely integrated with the morphological and typological choices and regard: the use of renewable energy (solar, geothermal, wind energy, biomass power plant), the definition of waste and water cycles, the use of bio-architecture. Thus, the new city, on one hand, finds its foundational features in the historic city (tradition) and, on the other hand, faces the contemporary age with a typological mix and an energy strategy (innovation).

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RETHINKING THE CONCEPT OF THE NEIGHBORHOOD: AN ENABLING OR A HOUSING MODEL?

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Abstract
Aiming at achieving the utopian housing scheme, contemporary housing studies have exhibited an increasing interest in the concept of the neighborhood; its design, components, and relationship with the surrounding. The concept of the neighborhood, as introduced by Perry in 1929 is considered a utopian approach that seeks to create a residential community, socially and spatially, in which the sense of community as existed in pre-industrial cities prevails. It arose as one of the modern reformist approaches that appeared in response to the urban ills that characterized the modern capitalist society such as social disintegration, inequality, and injustice in resource distribution and life chances. Likewise, aiming at achieving the socio-spatial ideal, many postmodern approaches emerged to create the ideal residential community; most prominently is the movement of “New Urbanism.” But did these utopian approaches succeed as community-housing ideals in providing appropriate housing (spatially) and realizing the sense of community (socially) at the same time? This research attempts to read critically the concept of contemporary neighborhood, particularly the movement of “New Urbanism” in terms of its ability to fulfil its aims in producing a residential coherent community, socially and spatially. It compares the production mechanisms, decision-making processes, and distribution and nature of rights in New Urbanism with the concept of residential communities in traditional Islamic built environments. It is concluded that, adopting capitalist production mechanisms characterized by centralized domination, hierarchical power structure, and lack of residents enablement, New Urbanism was no more than a spatial solution that produced residential compounds (spatially) rather than enabled communities (socially). As such, it is merely a housing scheme that failed to be qualified as a socio-spatial ideal, as targeted.

Keywords: The neighborhood; khitta; Community; New Urbanism; Rights; Spatial; Social; Levels of the built environment

INTRODUCTION
In its modern definition, the term “housing” embodies the meaning of providing accommodation or shelter by one party to another. As such the housing process involves two parties: the producer and the beneficiary or the user. The concept of housing has become widely recognized in urban studies in light of the urban problems that followed the industrial revolution in the nineteenth century in Europe, such as homelessness, a situation that required intervention from the State to provide appropriate housing to those who cannot afford it. However, in spite of such efforts, the problem still persists today and even increased in scope and severity. According to the United Nations statistics, the number of those who live in slums rose by 55 million people since the year 2000; in some cities, up to 80% of the population live in slums. What is more is that by 2030, 40% of the world’s population, or about three billion people will need proper housing and access to basic services such as water and sanitation. This means that 96,150 new affordable residential units have to be supplied every day or about 4,000 units every hour until the
year 2030 to cover this need (UN-Habitat, 2014a). Such statistics are a clear manifestation of the crisis and the malfunctioning of this urban sector.

Consequently, the concept of housing had to be dealt with from a more comprehensive perspective; as an urban question that is related to many urban social and economic problems prevailing in capitalist societies. The housing question is not anymore an isolated matter that can be tackled quantitatively by providing more housing units; it is a question of the housing and the housed together; i.e. a socio-spatial question. In light of the emergence of the Modern State or the “Welfare State” that has become responsible for providing the basic services to its citizens, including housing, and in light of the rising of many social problems such as social disintegration and poverty resulting from inequality and injustice in the distribution of resources and life chances, produced by modernity and capitalism and led in turn to the emergence of the housing crisis in capitalist societies, calls mounted in an attempt to bring attention to societal issues such as social justice, freedom and democracy as a crucial part of the socio-spatial question of housing.

As Engels in 1872 has attributed the housing crisis (The housing question) to the capitalist system *per se* (Murphy and Hourani, 2013), several modern reformist approaches occurred seeking to provide socio-spatial housing solutions, most important of which are those calling to achieve the sense of coherent, utopian community that is enabled, i.e. has the power of decision making within its residential area. Examples of such approaches are those of Charles Fourier, Robert Owen, the Garden City of Howard, and the neighbourhood unit of Perry in 1929. Through these approaches, the concept of the neighborhood arose as a utopian socio-spatial housing model that deals with the housing question as related to some social issues. Today this concept is still in use (with different foundations) in several post-modern approaches, most well-known is the New Urbanism movement that seeks to create the concept of utopian community within its neighborhoods. However, were these approaches able to provide socio-spatial housing solutions, i.e. provide proper housing for citizens and fulfill the sense of enabled community at the same time? In other words, did the modern neighborhood and later the contemporary (postmodern) neighborhood succeed in developing an enabling socio-spatial housing model, or is it no more than a physical housing (spatial) model *per se*?

This research aims to critically read and evaluate the concept of the contemporary neighborhood in terms of its ability to achieve its goals as an enabling socio-spatial housing model, with a special focus on the movement of New Urbanism as an example, due to the movement’s widespread and acceptance worldwide. Scrutinizing the history of housing, it can be noted that the concept of housing was not prevalent in the pre-modern age, specifically in traditional Islamic cities. This brings us to the question that: why housing crisis and related urban social problems did not occur in the past whereas they are today of the most discussed issues locally and globally? The main reason for this, as this research argues, lies in two main changes associated with the emergence of capitalism and modernity. Those are, first, changes in the mechanisms of housing production and related decision-making process; second, changes in the agency (party) responsible for the production of the built environment, including housing. To understand this transformation, the research scrutinizes the built environment production process at its roots, following a comparative methodology between residential communities in traditional Islamic cities and the transformation that took place in the age of modernity and capitalism in terms of the production mechanisms and some related concepts, mainly the decision making process and rights distribution, and its impact on the housing question, socially and spatially. Thereby, the residential communities in Islamic cities and their production mechanisms will be explored first to be followed by the transformation that took place, clarifying the reasons of that transformation and its impact on the concept of the neighbourhood.
RESIDENTIAL COMMUNITIES IN TRADITIONAL ISLAMIC CITIES

The territorial structure of traditional Islamic cities is made up of a group of contiguous and overlapped spaces known as (khitat) (singular khitta) (the closest term in English is “territory”), where each khitta is owned and controlled by a certain party. The dead-end street and all abutting houses is a khitta and the residential neighborhood (hara) is a bigger khitta. Khitta, as used by historians in their manuscripts about Islamic cities, is indicative of control; it is a defined area of influence controlled and managed by a specific party (Akbar, 1992). The dead-end street is in effect owned and controlled by residents of abutting houses which doors open onto it thus constituting a khitta; the through street is a khitta owned and controlled by all passers-by collectively, and so on (Akbar, 1988, 1992). Substantial evidence of khitta’s control and autonomy is the gates at their mouths.

The word khitta in Arabic is derived from the root verb khattah which implies possession of a place by the person for himself, with the ruler’s consent. Residential communities in Islamic cities constitute the greater part of those territories or khitat, where they interact physically and in terms of their associated rights, i.e. socially. They are thus territory-based communities.

As to the production mechanisms of those territorial communities, they were relatively self-directed and -applied. Residents themselves mark out (ikhitat) their houses and neighborhoods, however, with the ruler’s consent. It was, in today’s terms, a decentralized mechanism with bottom-up decisions without any external intervention.1 The decision making process was in the hands of the people themselves, at their sites, where the ruler’s permission was sought only as to the location of the khitta and not in determining its internal organization. 'Ibn Manzur (a prominent Arabic linguist, died 711 H.) states in that respect: “the property is territorialized by a man in an unowned land who demarcates it and builds over it, this is if it was approved by the ruler for a certain group of Muslims to territorialize properties in a specific location and build their houses on it, as did in al-Kufa, al-Basrah and Baghdad” (vol.1, p.858). Al-Baladhuri (d. 279H.) in his description of al-Basrah, mentioned that “…the people marked out and built their houses…” (p.342). Also, Abu Yusef (d. 182H.) relates about al-Kufa that “people marked out al-Kufa and settled in it” (p.30). In the same respect, al-Ya’qubi mentioned about settling in al-Kufa that “…Yazid bin Abdullah marked out the area towards the desert, and Bajla marked out around that” (vol.2, pp.150-151). Thus, territories and their internal spaces of streets, squares (rihab) and dead-end streets were owned and controlled by their users without any external intervention from the higher authorities, for example. They enjoyed autonomy and freedom in decision making. In al-Kufa, for example, each tribe had an independent territory (khitta) that includes multiple functions to serve its residents such as a mosque, a market and a cemetery; it was like a multi-functional neighborhood, in the contemporary sense. Streets between khitta defined the external boundaries of the khitat (Akbar, 1992).

To understand these mechanisms and their operation in the production and management of Islamic residential communities, a case study (nazila) will be presented from historical Islamic jurisprudence books. It was reported that if a man owned a house in a through street which back faces a dead-end street, and he wanted to open a door in the back of his house that opens onto the dead-end street so that passers-by in the through street can reach the dead-end street, then he is now allowed. An-Nawawi (d. 676 H.) justified that in his book Al-Majmou' by stating that: “if the door of the house opens to the street and its back to the alley, and he opened a door from the house to the alley, the case is looked at: if the door is opened to pass through it to the alley, then it is not permitted as he granted himself the right of istitraq in an alley that is owned by its residents and he has no right in its driveway …” (vol. 13, pp. 411-412). Ibn Qudamah in his book

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1 The reader might think that the term “bottom-up” as a mechanism of decision making in Islamic residential communities embodies a positive meaning versus the “Top-down” mechanism that embodies a negative connotation. The social and physical structure in Islamic cities is a non-hierarchical structure that is devoid of levels of decision-making; there is no top or bottom level. These terms are used here because they are very common in the field of urban planning and sociology, thus they are not intended to be used here in their precise meaning which reflects the vertical structure of their capitalist society.
Al-Mughni (of the Hanbali school) avers that "... if the house door was to the street and the back of his house to the alley which is not through street, and he wanted to open a door to the alley to get the right of use, it is not allowed as he has no right in the alley which is owned by its residents" (vol. 4, pp.570-71). In other words, if the owner of the house with two doors wanted to enable people to pass through to the dead-end alley, then he is not allowed because such an action grants the right of istitraq" to someone who does not have this right, thus increasing the number of passers-by or users of the dead-end street.

Highlighting what-an-Nawawi reported in this case that “the alley is owned by its people,” and “the man has no right in it,” and 'Ibn Qudamah’s saying that “he has no right in the alley,” the issue of property rights is clearly stressed here and its regulative quality of people’s relationships among each other and to the place. That is, the production process of Islamic built environment and its management is in principle governed by a structure of rights derived from Shari’a (Islamic legal system) that is associated with the place to regulate its relationships with other places (e.g. property rights and associated right of control, right of istitraq). Let us name these rights “spatial rights.” There is also a structure of rights that regulates people’s relationships with each other and as related to their properties, which in turn prevents domination of one party over the other, such as the rights derived from the prophet tradition “No harm, no reciprocal harm." These rights will be referred to here as “social rights.” The resident has a right in his house as a khitta, and he has also rights in the street to which his house door opens. Similarly, the house has rights, and the dead-end street has rights, and so on. Those rights are enabling rights that grant their parties power of decision making in their respective sites (Al-Lahham, 2005). The dead-end street in Islamic cities was owned by its people who have rights of control and use over it, thus decisions regarding any physical changes in the dead-end street were in the hands of its people themselves. Their permission has to be sought before any physical action can continue. As mentioned in the above case (nazila), permission of the alley’s residents has to be sought to undertake the changes. In other words, decisions emanated from residents without any external intervention from the ruler or his representatives. This enabled residents in their territories and granted such territories great autonomy in their production and management processes, and connected people together into a coherent community. Hence, decision-making mechanisms in Islamic residential khitat were enabling consensus-based mechanisms without any external intervention.

The Islamic city can thus be visualized as comprised of a large group of relatively independent spatial territories (khitat), however, they are overlapped due to the overlapped circles of their respective spatial and social rights (fig. 1). The party who owns a house in an alley is a partner in the party in control of the alley, and a partner in the party who uses the through street, or of an adjacent alley, and so on. Thereby, the Islamic city is composed of two layers: spatial layer and social layer. Both layers are intertwined because rights, including social and spatial rights, regulate and interact with both layers, producing proper physical-social solutions. The spatial khitat form independent khitat sometimes and sometimes overlapping ones which support the city’s physical/social structure, enhances its cohesion, and prevents it from turning into fragmented, mosaic city/society divided into isolated communities behind closed walls, as the case in contemporary gated communities.

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2 Istitraq right determines the rights of all residents in the dead-end street according to location of house doors in the road. It is not permissible for the party whose house is near the mouth of the street to object to the actions of the owner of the house at the end of the road if the first party is not affected by the second as his house is remote from the latter’s house. ‘Izz bin 'Abd as-Salam explored this principle as "doors that open onto dead-end streets indicate the partnership in these streets up to the door of each house, so that the first is a partner from the mouth of the street up to his first house door, and the second is a partner from the beginning of the street up to his second door, so as the third and the fourth till the one at the end of the street become a partner from the beginning of the street to the last door, and has solely the right of what is beyond these doors to the end of the street, according to the doctrine" (vol. 2, p. 118).

3 For more on the concept of damage, see (Akbar, 1992; Al-Lahham, 2005).
In one case (*nazila*), some people had dead end alley onto which their house doors open as well as the backside of their neighbour’s house which has no access to the alley, however, he had an old covered septic tank attached to his house’s wall and had a conduit that comes out of his house. The neighbour did not use the septic tank and the conduit for a long time, and later he wanted to use it, but the people of the alley did not allow him. Their decision was ruled out and the septic tank continued as it has the right of precedence in the alley (spatial right) (al-Wansharisi, vol.9, p.32). In this case, and in spite of the autonomy of both adjacent *khittat*, they overlapped in terms of their rights through the septic tank, prompting the owner of the septic tank who is a partner in his alley to negotiate with the party of the alley in which his septic tank is, thus the two adjacent territories (*khittat*) were not isolated, but intertwined, physically and rights wise. Those rights were self-enforcing except in case of disputes between involved parties where the judge’s rule is mandatory for all parties concerned. In that sense, rights in Islamic cities organized the relationship between adjacent territories (*khittat*) and their residents.

By enabling people through granting them the necessary power derived from their rights, residents were able to produce physical solutions from within their sites that were commensurate with their needs, values, and specific conditions. As each party in the residential *khittat* is aware of his rights in his site as well as others’ rights, this resulted in a physical/spatial structure in which vertical relationships between parties were reduced to the minimum, if not completely diminished. No domination existed between parties as well as no external intervention. The enabling rights (social and spatial) direct the interaction between the spatial and social layers and regulate them; they perform through the enabled party to produce and reproduce the place. In other words, the two layers, through the structure of rights, are in a mutual ever-interacting process. To understand this more profoundly, the built environment has to be analysed at its different levels, as contended by this research.

Figure 1. Territorial structure (*khittat*) in an old district of Tunisia. The circles do not denote the exact boundaries of the *khittat*, but only indicate the overlapping between these *khittat* in terms of their spatial and social rights (Source: Author)
LEVELS OF THE BUILT ENVIRONMENT

The built environment, in general, can be viewed as consisting of three levels or structures: first, the manifested structure which comprises the end-products as streets, neighborhoods, buildings and alike. Second, the operative structure which includes the economic and administrative systems, as well as people’s customs and traditions. Those are relatively dynamic. Thirdly, the imperceptible structure which is the deep level that includes power and rights distribution, mechanisms of decision making processes, and alike. The three levels are interrelated in a manner determined by the type of its built environment, specifically its production processes and decision making mechanisms.

The Islamic built environment is characterized by perpetual overlapping and interaction between its levels as if they are three intertwined circles; they represent structures or circles of exercitation (operation) and not levels of domination (with the hierarchical meaning of the word) (fig. 2). The structure of rights (social and spatial) at the imperceptible level interacts with the spatial layer (territorial/ khitta structure) in the manifested level, and with the economic and social structures in the operative level, thus there is no domination of one level over the other. Mechanisms of decision making (from the imperceptible level) of Islamic built environment production were self-employed by the parties concerned themselves. The party in its territory (khitta) (from the manifested level) enjoys social rights, also his property enjoys spatial/property rights (imperceptible level) where both structures of rights interact leading to the production of physical solutions that fit their operating social and economic systems (operative level), as if the acting party is the main axis that connects the three levels of the built environment together, thus constituting the connection between their centres (fig. 3). That unification of the acting party in the three levels led to overlapping, non-hierarchical socio-spatial structure that rendered its society with equality and justice, and accomplished a state of equilibrium clear of socio-spatial housing crisis such as that worrying the world today.

Figure 2. Overlap and interaction between the three levels of Islamic built environments. The size and organization of the circles (levels) are diagrammatic and not definite. They are defined by the relationships between the three levels in the site itself (Source: Author)
TRANSFORMATION OF THE BUILT ENVIRONMENT

Accompanied by the emergence of capitalism and modernity as a corrective progressive project in the eighteenth century, the concept of the modern State as the rational, organizational party responsible for fulfilling the project of modernity transpired. The modern State was founded on principles of sovereignty, legitimacy, and representation to form a “superstructure” independent from its people, however representing them. Hence, it holds the higher legislative authority that helps it protect its people’s good and manages its affairs. It possesses the power that conferred it rights to intervene in all aspects of society under the name of organization. To protect its sovereignty and authority the State enacted laws and regulations which it views as serving the society’s general good, also it expanded its circles of acceptance (control) through the built environment.

Stemming from its confidence in the concept of environmental determinism based on science and rationality which embodies the idea that changing the built environment will inevitably change its society, known as social engineering, the State since 1870 converted streets and railroads into public properties and appropriated the infrastructure and other related services. This gave the modern State a legitimate cover to intervene in and control the built environment, a matter that marked out the transformation in the production of the built environment and related decision making process. Whereas the decision making mechanisms in Islamic built environments were self-implemented with residents at their centre, each in its site, it turned under the modern State into a centralized mechanism, with the State at its centre. Under the emblem of organization and social engineering (changing society into a rational, organized society) and provision of urban development, the State seized the responsibility of built environment production including the infrastructure from the hands of the society to be the sole party responsible of them, and the people are subject to its dictated laws and regulations that is stemmed, as claimed, from its commitment to their public good. On the basis of its patriarchal role, the modern State became the “Welfare State” that is responsible for many aspects of its society’s life such as education, health, housing, provision of infrastructure, urban planning, city management, and alike.

At the end of the Ottoman Empire, lands owned by all Muslims collectively in the Arab world began to be converted into State lands owned and controlled by the State. Following the example of European countries, the Ottoman Empire issued a set of laws and regulations, among which are the Ottoman land system of 1858 in which lands were categorized into five types: owned lands, Amiri lands or State lands, waqf (endowment) lands, vacant lands left for public benefit such as grazing fields, and dead lands which are unowned and unutilized lands far from the urban areas with at least one and a half miles, and not left for public use. Later on, the Syrian civil law of 1949 has changed dead lands or vacant lands into State lands, so as the Iraqi law of 1938. In Egypt, revivification of dead land has been cancelled gradually, however, in 1964 the entire system of revivification of dead lands was cancelled and all dead lands were converted into State lands (Akbar, 1992, p. 117, 131).
Accordingly, most aspects of people’s lives became politicized, and the State became the reference in formulating and allocating their rights and duties, part of which is their rights and role in the built environment. The State became centralized, responsible for the people and their built environment, i.e. the social and the spatial.

To sum up, the transformation occurred as a result of two main changes, first, changing the decision making mechanisms of built environment production, and second, changing the party responsible of built environment production. As a result, the built environment has transformed from a residents-based, self-produced environment to a built environment that is produced by an external party, and residents themselves were transformed from being an “intraneous” enabled party involved in the decision making process of its built environment production into a passive party that is detached from the process and acts as a recipient only, turning the State into the central party in control of the built environment production. The crisis started here; the socio-spatial housing crisis.

Looking at this transformation from the perspective of the levels of the built environment, it can be noted that these levels have been transformed from being overlapping circles in the Islamic built environment into separate levels that are correlated through one-way hierarchical relationships; from the imperceptible level to the manifested level, a matter that resulted in the dominance of the deep level (imperceptible) over the lower levels (operative and manifested) (fig. 4). As the State is based on concepts of modern power and authority, the power structure and related enactment of laws and regulations (at the imperceptible level) were in control of the operative as well as the manifested levels. Hence, one of the main criteria of obtaining a state of equilibrium in the built environment, which is the interrelationships and perpetual interaction between the three levels of the built environment, has diminished, leading to a state of instability in the contemporary built environment, socially and spatially. This transformation and separation between the levels of the built environment has been associated with another separation, that is the dispersal of the axis of these levels. Instead of having one pivotal party linking the three levels and their interactions together, as in Islamic built environments, this was dispersed in contemporary built environments into several parties controlled by a one external, dominant party. Residents as a party are in the manifested level, professionals, politicians, economists, and alike are in the operative level, and the State in the imperceptible level. As if rights were scattered among different parties instead of being concentrated in the hands of a one core party. Each level has its party instead of one pivotal party that links all levels together. Accordingly, rights distribution has been changed and consequently societal power structure, which led to rendering the relationship between these parties as hierarchical, with the State holding the supreme power. Seizing rights from the previously central party (residents) into a one dominant centralized party led to dis-enablement of residents in the decision making process of built environment production. However, how does this transformation affect the concept of housing in the contemporary built environment?

Figure 4. The relationship between the three levels of contemporary built environments is a one-way hierarchical relationship, from the imperceptible to the operative, to the manifested level (Source: Author)
As part of its role of society upkeep and provision of basic living services, the concept of housing has shifted from production of houses by the resident himself based on his enabling rights to a basic service that the State provides. The production process of houses has shifted from being a self-based process disseminated among all residents into a centralized process controlled by the State. This led to intensifying the process to become an increasingly heavy burden that cannot be handled easily, thus arose as an urban crisis. First signs of this crisis have begun to occur in the nineteenth century, in the wake of the industrial revolution and its subsequent social, environmental, health problems, and decline in the standard of living, especially of housing. In these circumstances, housing problems, physically and socially, started to escalate. Calls to resolve this crisis have arisen; unions were formed calling for providing citizens with adequate housing and considered it as a right; the right to housing. This right is recognized in many national constitutions and in the Universal Declaration of Human Rights. In other words, what people are demanding today as a right that the State has to realize was in traditional Islamic cities a self-based, enabling right in the hands of the residents themselves, however, that right has been transferred with the transformation of the built environment production from the people to the State, thus residents became an external party, calling to regain that right. Such a right did not only shift in the party associated with it, but also in its nature. It changed from being an enabling right in Islamic societies that grants its holder the power to decision making into housing right per se that enables its holder on the manifested level only, with no power to decision making in the operative and imperceptible levels. Consequently, many studies and approaches emerged to resolve this crisis, ranging from merely housing approaches that dealt quantitatively with the problem, aiming at producing the largest possible number of housing units, i.e. perform on the manifested level solely and is controlled by the imperceptible level through housing policies and schemes set by the State, to more comprehensive reformist approaches concerned with the physical housing and its residents together, thus focused on how to create residential communities characterized by social cohesion instead of social disintegration that concerns many scholars today. The concept of the neighbourhood came to the forth as a result.

THE NEIGHBORHOOD: IS IT A SOCIO-SPATIAL HOUSING MODEL?

Many urban social reform approaches that emerged since the 19th century attributed the urban ills that dominated the capitalist society socially and spatially to capitalism per se and its centralized decision making mechanisms, or according to this research, to the transformation that took place in the production process of the built environment. Several of these approaches were founded on the rejection of some aspects of modern capitalist society and aim to realize the concept of the collaborative community characterized by cooperative social relationships among its residents, where decision making is in the hands of the community and not with any external party (Hall, 1996; Friedmann, 1987). Of these approaches are those of Charles Fourier and Robert Owen which stressed the ability of the built environment to affect its residents and create the good community through the modern concept of environmental determinism. Similarly, Howard introduced through his theory of the Garden City a utopian reformist program that

5 The right to housing is the economic, social, and cultural right to adequate housing and shelter. This right was discussed at the 1996 Habitat meeting in Istanbul where the steps required by governments to "promote, protect and ensure the full and progressive realization of the right to adequate housing" were identified in paragraph 61 of the agenda (UN Habitat, 2014b).

6 Fourier introduced the idea of "Phalanstere" as a new model for small self-contained communities. Each community is comprised of a group of four story buildings, where the rich live in the upper floors while the poor live in the lower floors. The population of each community ideally consists of 1,620 people working together for mutual benefit. Robert Owen used the idea of "Philanthropy" which means "love of humanity" to improve the conditions of workers and the poor. He founded a number of ideal self-contained cooperative settlements in Britain and America based on his idea (Alexander, 1992). Owen’s community consists of 1,200 people, living in a square-shaped area of 1000 to 1500 hectares so that each group lives in one square-shaped building with a shared kitchen and a public room, and each family has its private apartment. Owen’s ideas failed when implemented (New World Encyclopedia).
includes the creation of self-contained, -managed, and -governed settlements which he called “social city,” characterized by the spirit of the community, cooperation, and liberation especially from the large-scale State intervention. These communities can be produced gradually through a series of housing cooperatives. Howard claimed that his model offers an alternative social economic system that can replace capitalism and bureaucratic centralized socialism (Alexander, 1992). Evolving from the Garden City and embracing the concept of modern determinism, C. Perry introduced the concept of the neighbourhood unit in 1929. It aimed at finding or, to be more accurate, “industrializing” the good community within a defined territorial space. Hence, all the above approaches were, as claimed, socio-spatial solutions in which the physical housing schemes were but a step towards creating the requested sort of community.

Relating these approaches to the argument of this research, they seem to be calling for returning to the mechanisms of built environment production before the transformation. They call for adopting self-based production mechanisms, applied by the residents themselves without intervention from any external authority. That includes the exclusion of the State as an external party from the decision making process and transferring the capacity of decision making to the residents to be the inanimate party responsible for the built environment production and reproduction. Hence, the three levels of the built environment are to be re-joined as overlapping circles with continuous interactions between them and the enabled residents as the pivotal party of all of them. However, these modern approaches did not propose any mechanisms of how to reverse the transformation and re-transfer the rights from the State to residents.

In the light of the modern State’s sovereignty and basic underpinning concepts of power and authority (Al-Lahham, 2005), these reformist approaches were unable to pull power and capacity to decision making from the State and alter the societal power structure, thus could not change the imperceptible level and its central party. Accordingly, their schemes turned out to be partial, hypothetical, and unrealizable. In practice, as employed in some housing communities, they were reduced to mere self-managed gated housing compounds, governed by certain agreed-upon rules set by the residents themselves, within closed walls. They had no social reformist impact on the broader society whatsoever. If such housing compounds spread in the capitalist society, they will form isolated circles with no overlap socially or spatially, thus forming isolated, closed islands, leading, contrary to their goals, to further fragmentation of society and turning it into a mosaic, not-coherent society, socially and spatially. Moreover, rights embodied in the laws and regulations enacted by the State belong to the imperceptible level and control the built environment on the manifested level. The separation between city levels (social (rights) and spatial) made the spatial layer limited within the manifested level only, and relates it to rights within the imperceptible level through a one-way vertical relationship, from the imperceptible to the manifested, leading consequently to the failure of these approaches.

Despite the failure of these modern approaches in accomplishing their objectives of reform, whether to change the mechanisms of built environment production or to change the relationship between the levels of the built environment and linking them together in an interactive and reciprocal way, many of these approaches began to emerge again today, however, in a new form. With the advent of postmodernity and its calls of re-communication with the user and the revival of the spirit of the place through bonding it with its past and context, and based on Jane Jacobs’s theory (1961) which advocated some urban concepts that were prevalent in Middle Ages cities in Europe such as mixed-use planning, several approaches emerged since the seventies of the last century which referred to the community-based systems (e.g. commune) in the pre-industrial western world as a way to tackle contemporary urban crisis. The most important

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7 In achieving his socio-cultural goals in the residential unit, Perry attempted to develop the role of local schools into community centers through parents’ involvement. The elementary school and its playground became the center of the neighborhood which is reachable on foot within half a mile, local shops are located on the corners of neighborhoods, and a few community institutions are located in the central common place (Hall, 1996).
of these approaches since the end of the eighties of the last century and until today is the movement of “New Urbanism.” It aims to reform the urban residential areas following postmodern notions derived from traditional pre-industrial western cities. This movement has received widespread acceptance in U.S., Europe and in other parts of the world including some Arab cities such as Dubai, Doha, and Abu Dhabi.

THE NEW URBANISM MOVEMENT

The movement of “Neo-Traditional Development” emerged in the U.S. since the eighties of the last century, but the term “New Urbanism” (henceforth NU) began to take effect since the 1990s to denote the urban development undertaken by Duany & Plater-Zyberk, and the “Transit-Oriented Development” pioneered by Peter Calthorpe, Doug Kelbaugh, and Daniel Solomon. This movement originates from the rejection of the principles of modern urban development and urban sprawl, and, as an alternative, adopts postmodern principles such as those of Leon Krier, Jane Jacobs, and Lewis Mumford, as well as Perry’s concept of the neighbourhood.

This movement aims to create residential communities with pre-set qualities under the umbrella of capitalism. That is, NU does not reject capitalism as a societal system, neither its mechanisms of decision making and built environment production, however, it rejects the physical end-product as produced by modernity. NU movement, unlike modern reformist approaches, accepts the prevailing power structure in the capitalist society and does not seek changing it. In other words, it accepts the imperceptible structure of the built environment including the centralization of power in the hands of its pivotal party, the State. It also accepts the vertical relationship between the levels of the built environment. However, in light of the social disintegration and the lack of the spirit of community produced by modernity, and the resultant rupture between the building, the user, and the context, NU strives to create (or “industrialize”) the sense of community as existed in pre-industrial societies. That can be achieved, according to NU, through relating architecture to its context, historically and geographically so as to create the sense of place and belonging. NU attempts to achieve that through using images from the past that are connected with the user’s memory, or what is referred to as the “urban memory.” This methodology to reproduce the place through influencing the user’s perception and communication with the place focuses in effect on the spatial layer (formal) that belongs to the manifested level of the built environment more than on the social layer. It uses formal/spatial solutions to resolve social problems. In that sense, NU adopts the same modern concept of determinism which was the reason behind the absenteeism of the sense of community in modern residential areas in the first place, however, in a postmodern sense (Al-Lahham, 2011). Sorkin in that respect mentions that “New Urbanism reproduces many of the worst aspects of the Modernism it seeks to replace. [it] promotes another style of universality that is similarly over reliant on visual cues to produce social effects” (cited in Dewolf, 2002).

NU links between the house and the resident, or between the place and the community (socio-spatial), where the community is identified through its relationship to the place geographically; it is thus a place-based community. This is similar to the concept of khitta in Islamic cities, however, on the manifested level only and not in the production mechanisms and distribution of socio-spatial rights and relationships between the levels of the built environment, or put differently, without enabling the residents, as explored below. Accordingly, the term “residential compounds” will be used here to refer to UN residential districts as against the term

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8 The movement of New Urbanism includes many approaches, including Traditional Neighborhood Development led by Duany and Plater-Zyberk; the Pedestrian Pocket that depends primarily on walking led by Kelbaugh; Transit-Oriented Design that depends on public transportation led by Calthorpe; and the Quartiers of Leon Krier. All those approaches share the concern of referring to the traditional urban style to devise contemporary planning principles (Bohl, 2003).

9 For more on the definition of the sense of community, refer to (McMillan & Chavis, 1986; Farahani & Lozanovska, 2014, p. 225).

10 In the last few decades, such an approach was adopted by a few similar studies to create the sense of community in the neighborhood (e.g. Moustafa, 2009; Farahani & Lozanovska, 2014).
“residential communities” used for Islamic built environments. But, did this movement succeed in creating the good community in its compounds through establishing a connection between residents and their places, as planned?

Methodologically, despite the growing number of studies conducted on NU, most of these studies focus on the effect of a few physical features of NU built environments (such as pedestrianism, diversity, mixed land use) or of some social aspects (such as social interaction, user perception, identity, homogeneity) on establishing the sense of community (Kim, 2007; French et al., 2014; Talen, 2008). They depart in their investigations from their definition of the sense of community based on their acceptance of capitalism and its mechanisms of production. In other words, they are trapped within the sphere of capitalism. The current research, different from other studies, focuses on the roots of NU production and mechanisms; it explores NU based on the three levels of the built environment and their interaction. Moreover, as NU movement received many criticism in terms of its approach and mechanisms to fulfil its goals (Talen 2008; Kim, 2007; Grant, 2006), also its compounds such as Celebration district in Florida, Kentlands in Washington DC, and Uptown district in San Diego were assessed (e.g. Bressi, 2002; Kim, 2007), the current research will investigate NU movement on a theoretical level based on the argument it put forward, however, it will refer to these empirical studies to support its argument.

Several social studies have shown that the absolute deterministic relationship between the built environment and social relationships inside residential areas, or between the spatial layer and the social layer of the built environment, is unviable and such a relationship is flawed and unsatisfactory in its attempt to establish the sense of community, which dissipates the dream of modernity to change society through the built environment, and that of postmodernity and NU to create the good coherent community as that of pre-industrial cities (Kashef, 2009; Talen, 1999). Wood and other authors (2010) found that mixed land use was negatively associated with sense of community in Atlanta, USA. Similarly, Nguyen (2010) found that compact living, high population density, and street accessibility at the county level in the USA were inversely associated with social interaction, bonding, and bridging social capital. This shortcoming might be justified by the separation of the levels of contemporary built environment and their subsequent pivotal parties. The social layer belongs to the operative level (values and customs) and to the imperceptible level in terms of the societal power and rights distribution, whereas the spatial layer belongs to the manifested level. Each level has its pivotal party, thus connecting the two layers (social and spatial) together requires rearranging the relationships between the three levels by eliminating domination between them and then overlapping or even unifying the acting parties of the three levels. This is of course most unlikely to take place in the contemporary built environment. Whereas spatial rights from the imperceptible level in Islamic communities were overlapped with the manifested (spatial) level, and the social rights were also overlapped with the operative level as to the social relationships governed by society’s customs and values prevailing in each region, and with the manifested level as to property rights, this led to tying these levels together as an intertwined network. However, this network has been disintegrated in contemporary built environments into vertically-related levels.

Social and spatial rights are dictated over people in the operative and the manifested levels in the form of rigid social laws and building regulations, thus parties in those two levels have no role in its formulation or implementation. They ordain the subjected party (residents) what to do and define their circles of freedom in their respective levels. Hence, splitting the built environment levels led to splitting its layers, a matter that makes it quite difficult to deal with the setting

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11 This differentiation is because NU developments, as explained here, were no more than compounds to house people, with no foundation to create the good, coherent community. Moreover, NU compounds are quite different in their principles from those of Perry’s neighborhood; therefore, the term “residential compounds” will be used to refer to NU developments and not neighborhoods.

12 Such as the social studies of Urry, Sayer, and Giddens which proved that space is a contingent factor rather than an essential factor in studying social relations (Saunders, 1993).
comprehensively. This led to increasing the severity of the housing crisis and the associated social ills, thus resolving the social and spatial housing problems together became very problematic despite their actual interdependence. Accordingly, as revealed by studies conducted on some NU compounds in the US such as Seaside and Celebration districts in Florida (Bressi, 2002) and Uptown in San Diego, the NU movement did not succeed in changing residents’ behavior and consolidating the social relationships among them and, thus, in producing the coherent “good community” in place (Gottdiener & Budd, 2005; Grant, 2006, p.227-8).

The reason for this, as posed by this research, is due to the production mechanisms adopted by NU. They are the same mechanisms that operate in the modern capitalist society outside these compounds. Proceeding from the movement’s acceptance of the relationships between the three levels and their production mechanisms as exist in the capitalist society, NU adopted these mechanisms without change. The residential compound became like a microcosm of the broader capitalist society, dominated by the same mechanisms and relationships between its levels. However, how can NU achieve the desired change in society and create the sense of community through the reproduction of a microcosm of that society with the same mechanisms that produced the urban problems and ills in the first place? Mechanisms of NU compounds are characterized, as in capitalist societies, by central planning controlled by professionals (planners/architects) from the operative level, who are subject in turn to building rules and regulations set by the State from the imperceptible level. The role of the resident is limited to the manifested level as a recipient/user only, which might be expanded in best conditions to participation in the design process through expressing his opinion regarding some design issues, according to the designer’s wish, a mechanism that might increase the sense of belonging. Yet, many new urbanists, unlike other community neighbourhood planners, view NU as consisting of normative design principles and believe that participation does not lead to social equity. “It is the professional planner,” as Talen declared in her investigations of Mississippi NU developments, “that has the role of finding out how neighbourhood planning goals are to be accomplished through design and physical improvement.” As such, unlike the stated commitment to social equity in the Charter of the New Urbanism (Congress of the New Urbanism, 2000), NU design process does not show any particular interest in achieving social equity in its compounds (Talen, 2008, p.290). The user here relates to the designer/developer in the operative level in a vertical (dominance-subjection) relationship, where the latter is related to the State in the imperceptible level in a vertical relationship of dominance-subjection as well. As such, relationships between levels of built environment are vertical relationships characterized by dominance and control, where the resident in these compounds enjoys restricted rights within a very confined circle that might not exceed his house’s boundaries. They are non-enabling rights that do not grant the resident capacity to decision making; his role is limited to only being a resident/user, thus his rights in the compound are housing- and not enabling rights; they regulate his relationship as a resident with the compound (spatially) and with its population (socially). In that regard, studies of Kim on Kentlands (2007), designed by Duany and Palter-Zyberk in 1988, and of Buckner (1988) have shown that sense of community and belonging is associated with the sense of ownership in NU compounds, and it is even stronger in case of actual home ownership (Kim, 2007, p. 225). As ownership is a right that embodies control over the owned property, thus sense of community is

13 Separation between the levels of the built environment was reflected in many housing theoretical studies. During the last few decades, studies had two different approaches as to their focus: non-spatial social studies that attempt to address the social issues and the right to housing, i.e. concerned with the social layer such as the studies of Friedmann (2000) and Amin (2006), and spatial studies that focus on the housing issues, i.e. concerned with the spatial layer, such as the housing studies, and NU movement. Hence, contemporary mechanisms of built environment production proved to be deficient in facing the social and spatial problems of the housing sector together, theoretically and practically.

14 Many projects have been implemented according to the principles of NU movement in the United States and Europe, examples of which are the Seaside in Florida (1981) and the village of Poundbury in Dorshester, Britain, designed by Leon Krier (1993). Such projects began to spread in the Arab world and particularly in the Gulf States, specifically in the city of Dubai.

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evidently associated with the right of control which belongs to the imperceptible level of the built environment, a fact that new urbanists negates. As Gill asserts, “the new urbanists show little interest in the structures of power and inequality that undermine older districts or that disadvantage large numbers of urban residents. Instead, they look for simple, and sometimes wishful, strategies to guide development” (Grant, 2006, p.213).

The management system in the UN compounds and related rules imposed enhance this matter. Property management and control within the compound is divided between, first, a residential owners association as a representative of residents, which board is elected by the residents and is responsible for the residential area and the included public areas. Second, a commercial property owners association, which is responsible for the compound’s commercial center, including the public areas, parking lots, commercial buildings, and alike (Al-Lahham, 2011). These two associations have dominance over residents and users; they define their rights that are no more than housing rights within the boundaries of each resident’s house, which is also subject to strict rules set by the compound associations, such as restricting building changes in residents’ houses; a restrain that shrinks the circle of the resident’s rights, limits his freedom, and impedes his enablement. Areas between houses are subject to the residential owners association where the user has the right of use only in these spaces. Relationships between residents and the owners association in these areas tend to be domination-based relationships, regulated by certain rules set by the controlling party, not through consensus. Hence, there is no overlap between the spatial and social rights of areas in-between houses on the one hand and between them and the public spaces on the other hand, which lead to not relating residents with each other, spatially and in terms of their rights, as well as not relating residents to the place outside his house as his rights are limited to the regulated benefit of use only; right of control of these places belongs to the association (fig. 5). This separation and non-overlapping between circles of rights lead to separation between the social and spatial layers in the compound, as well as separation between the levels of its built environment, and the domination of one level over the other which contradicts with the goal of NU to create the sense of community. This is in direct contrast with the situation in khitat in Islamic communities which intertwining of social and spatial rights was the main rationale behind the solidarity and coherence of its community, socially and spatially. The resident in Islamic communities was part of the party that owns the street to which his house door opens, thus was involved with his neighbours in any case that might occur in the property. He was also part of the larger khitta and so on, until all khitat are connected spatially and in terms of their rights. However, what NU produces is fragmentation of society’s coherence by finding one party for the house, another for the street and a third for the centre of the compound, where all these parties are related to each other in a vertical relationship of dominance which positions the resident at the end of the ladder with very limited rights confined within a very small circle that is separated from other parties’ circles, spatially and in terms of rights, leading ultimately to a state of non-coherence and abolishes the sense of community.

With regard to rules and regulations governing the NU compounds, Duany and Plater-Zyberk, the pioneers of the movement, have set a few laws and regulations as to the zoning and use of public areas in Seaside district which they designed in Florida, USA. In 2003, they developed these laws into a prototype that came to be known as “smart codes” to govern later NU compounds. These laws included detailed codes to ensure the full control over the compound; they were design-based codes that were concerned with the three-dimensional designs of the compound and not only with its two-dimensional planning schemes (as in zoning and land-use regulations). This intensifies the designer, developer, and owners associations’ control over the compound’s built environment as well as over its users and shrinks the circles of

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freedom of its residents (Al-Lahham, 2011), a matter that is inconsistent with the concept of enablement in these compounds, unlike the situation in residential Islamic communities (khitta).

Figure 5. Residential Owners Association as a controlling party in the public residential areas such as streets and spaces in-between houses works as a barrier zone that separates houses spatially and as to their rights, leading to no-overlap between them in terms of their spatial and social rights. This leads to fragmentation and disintegration of the spatial layer (Source: Author)

NU methodology to find the coherent community works in opposite to its target. Referring to khitat distribution in Islamic cities which enjoyed social cohesion, they were overlapping territories arranged in size from the smaller to the larger, as well as in their related rights, from the house to the dead end street to the through street and so on. Hence, Islamic cities were divided into small but numerous and interdependent territories (khit), each indicates its party’s circle of control, thus, control over decision making was distributed between the largest possible number of parties (residents), or in contemporary term, decentralized (fig. 1). Moreover, the overlap between these many circles restrained the potential social or spatial domination between territories and its parties, which in turn led to a coherent society with, in principle, no domination from one party over another. Controlling parties in their territories enjoyed enabling rights, socially and spatially, which circles expand and intersect with other rights circles in larger territories. This makes the party connected to his territory spatially and as to his rights. This situation results in connecting the three levels of the built environment together into one solid structure which levels cannot be discerned. Comparing this with the distribution of spatial and social rights in NU compounds, every resident in NU compounds has a narrow circle of social rights that corresponds to his spatial rights limited within his house boundaries (fig. 5), where each circle does not overlap with other parties’ circles as circles of control of owners associations (imperceptible level) separate between them. Accordingly, the number of controlling parties in the NU compounds is very few, thus decision making is shared between very few parties, leading to centralization in the decision making process.

In addition to the limited rights of residents in the NU compounds compared to Islamic communities, the quality of these rights is also different. As the centralized party (owners

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16 These compounds are subject in their production mechanisms to the forces of the economic market which limit the resident’s freedom of choice. The designer and the developer head the design and implementation process which is directed to ensure the highest profit and the least risk possible. Thus, the freedom of choice given to residents becomes very limited and equal to what other housing models prevailing in the capitalist society offer. Accordingly, the end product of the compound is produced by external parties, unlike the situation in the Islamic societies where decisions and solutions were brought about from within the site by the residents themselves without any external intervention (Al-Lahham, 2011).

17 Architects and planners adopting NU principles stressed the importance of adopting NU smart codes in all cities and suburbs of U.S. in order to achieve what is known as “smart growth” as against the modern “growth” which resulted in urban sprawl with low density, total reliability on the car, and a rise in the cost of infrastructure. These codes were applied in some cities such as Davidson in North Carolina as well as in Cornelius and Huntersville (Walters & Brown, 2004).
associations) controlled the production process of the built environment, it appropriated the power to decision making, thus turning residents’ rights from enabling rights in Islamic communities into housing rights in NU compounds. This shift in the nature of rights has changed the relationship between the resident and his context, thus intensifying the user-context split and thus user’s acceptance of the existence of a supreme controlling party that weakens user’s awareness and sense of belonging and responsibility towards the surrounding built environment outside his circle of control; a point at issue that is very incompatible with the targeted sense of place-based community. Accordingly, NU, adopting the capitalist mechanisms of built environment production and the embodied separation between its vertically related levels, is not qualified as a socio-spatial solution; it did not succeed in resolving the urban ills through creating the good community within the good residential built environment. In conclusion, it could be argued that the lack of residents enablement in these compounds turned them into merely housing compounds, thus they deserve the title of housing schemes or compounds and not communities, as suggested by this research.  

**FINALLY**

The concept of contemporary neighbourhood (including the New Urbanism compounds) as a solution to address the housing problems and related social issues is not able to prosper unless the capitalist built environment production mechanisms which produced the housing-social problems are relinquished. These mechanisms are characterized by centralized control, vertical power distribution, and lack of resident’s enablement which form the basis of the housing crisis. Hence, the sought reformation cannot be accomplished in this respect without reformulating the mechanisms that produced it. Through liberating the built environment production mechanisms, changing the societal power structure, and enabling the residents through granting them power to decision making to produce physical solutions by themselves and for themselves, societies could become of high, ideal quality. Our role as professionals in the built environment is to implant the mechanisms that will inevitably lead to production of solutions by the people themselves who will through time become aware of their built environments. In other words, we have to transform people into conscious citizens that are aware of their built environments, not ignorant as the case in contemporary societies which isolated its people from the decision making process. The main motor in capitalist societies is idle as a result of its centralized dominance relationships, and there is no way to create the good coherent community except through enabling its people by granting them enabling rights and not housing rights solely, and that can only be realized through liberating the mechanisms of built environment production and adopting enabling mechanisms as those of the Islamic city.

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16 All NU compounds in America, due to their high cost resulted from the provision of public areas such as parks and squares and supporting services and infrastructure, have become affordable to only high to above average income people. They are designed to fit the requirements of a certain class of society who share similar interests and qualities such as homogeneity in the level of income and desire to live in a quiet and clean area. Hence, the case returned to where it began. Housing has become a scarce resource that is available only to those who can afford it. In that sense, the housing issue arises as part of the question of life chances and justice in the distribution and access to resources. Thereby, the main objective of the NU movement is negated, where the house in these compounds became a kind of social privilege that can be enjoyed only by those who can afford it. Thus, one of the most important criteria to achieve the good community has been abolished in NU.


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PUBLIC INTENTIONS FOR PRIVATE SPACES:
EXPLORING ARCHITECTS’ TACTICS TO SHAPE SHARED SPACE IN PRIVATE-LED DEVELOPMENT

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Abstract
From the late 20th into the 21st centuries, the private market increasingly gained control from public authorities over strategic decisions affecting the quality of, and accessibility to, new urban development. This paper argues for architects to act more explicitly to promote greater openness and use-value, rather than more objectified and controlled exchange-value approaches to the public domain in private-led development. The paper analyses two London-based residential case studies and interviews with the architects about perceptions of, and approaches to, private-led development decision-making processes. It compares the individual practitioner’s experiences of architecture practice with explicit intentions to influence better quality shared city space, examining professional norms vis-à-vis commercial clients and wider society. The paper concludes that greater awareness of architects’ knowledge, skills, and a range of tactics to influence future shared environments can contribute to improved professional practice frameworks for more effective engagement in an increasingly globalised and privatised urban society.

Keywords: Private-led development; shared residential environments; shared space; architecture; critical practice

INTRODUCTION
Inner-city redevelopment remains one of the most dynamic, and volatile aspects of an increasingly globalised and privatised urban society. Larger scale residential urban redevelopment can impact people’s everyday lives by adjoining, occupying, or replacing existing buildings and public spaces. Architects, once key professional actors in the decision-making processes affecting the built environment, have lost influence on strategic and detailed decisions affecting the quality of, and accessibility within, the majority of larger urban schemes. Architects working in more contested contexts are also often associated with an increasingly dynamic and complex range of clients and stakeholders, affecting all scales of decision-making from urban design to building shapes and material details (Carmona et al., 2002, p. 146). Research suggests that more studies are required to investigate the relationship between physical characteristics of residential environments and a more qualitative “sense of community” (Moustafa, 2009, p. 72). Sanoff argues that qualities of place, “sense of community and place attachment are linked to participation” in key decision-making processes (Sanoff, 2008, p. 61). However there is less evidence about who has the right to make certain decisions (including members of the public, affected communities, and built environment professionals) or how decision-making impacts qualitative outcomes when publicly owned property is transferred to private developers.

This paper compares and contrasts architects’ accounts about project roles and commissions with their perceived intentions to meet, challenge, or at times subvert private client’s expectations for the quality of, and public access within, new residential and mixed-use developments. It traces the privatisation of urban redevelopment processes from the late 20th into the 21st century and discusses concepts of urban place and qualities of what are described as...
more open, compared to more closed, types of urban space in larger-scale mixed-use projects. Through an interpretive phenomenological approach it investigates both the spatial and social implications of architects’ actions to influence private developer-clients and stakeholders, who might have opposing commercial expectations and social ambitions about the quality of residential environments and the broader public domain. Case studies have been selected from the author's larger body of research between 2009 and 2014, which includes interviews with six international architects and a number of additional project studies in the UK, continental Europe and farther afield. Given its available scope, this paper focuses onto two projects completed in the last ten years as examples of redevelopment in existing inner-city neighbourhoods in London, including private and public or shared public-private space and high density residential, commercial, and civic uses. In-depth interviews and project studies with the following UK-based practitioners are analysed:

- Peter Barber (Peter Barber Architects, London); Donnybrook, Bow, London.
- Liza Fior (muf architecture/art LLP, London); Barking Square, Barking, London.

Barber and Fior represent a sole practitioner and a small-medium sized office with more traditional, building, projects as well as collaborative architecture/art practices that defy traditional categorisation. The selection criteria included each person’s/practice’s engagement in private-led development processes and their perceived relevance to on-going debates within the UK and the Royal Institute of British Architects (RIBA) about current and future architectural practice.

Changing norms of architectural agency and urban regeneration

During the late 20th and early 21st centuries UK regeneration policy shifted toward market-led mechanisms where private institutions, not government, became the primary investors in urban redevelopment, and gained increasing control over the shape and management of large areas of existing cities (Minton, 2006). Associated changes in urban development processes and policies included the commodification of both public space and architecture while public authorities became “enablers” for private development projects rather than “providers” of large scale public works themselves (Madanipour, 2006). A number of sources have accused architects of “succumbing” to or perpetuating the effects of the market-shift upon society during this period of ideological and economic change (Dovey, 1999; Dutton & Mann, 1996; Graham & Marvin, 2001; Kaminer et al., 2010). Dutton and Mann (1996, p. 02), for example, argue that during this period architecture’s “emancipatory social project of modernity…lost its moral authority and its momentum” and was replaced “seemingly overnight” by the hegemony of global capitalism.

Debating qualities of shared space in private-led residential redevelopment projects

Research about residential and mixed-use redevelopment projects, across architecture and other built environment disciplines, supports arguments that private-led projects prioritise the provision of amenities controlled for the benefit of private users and vehicles over more shared and accessible “people-centred” spaces (Barrett, 2013; Gehl, 2006; Madanipour, 1999). A loss of active spaces for people and connections to the wider existing network of city spaces result from the nature of market-based residential developments which prioritise private exchange values over public use value (Healey, 1998, p. 216). While research from property and surveying sources associates the success of regeneration with levels of private investment and business or property-led models (Singhal et al., 2009), the conclusions of more critical evaluations contend that profit-driven development models lead to greater segregation and gentrification rather than inclusive aims (Imrie & Raco, 2003; Kaminer et al., 2010; Social Exclusion Unit, 2000). Developers of exclusive residential projects often refer to “market pressures” as a rationale for restrictive private access (Zukin, 2011, p. 41). Sustainably diverse, open, and dynamic shared city spaces on the other hand prioritise pedestrian-level activity, unrestricted access (i.e. the
opposite of control) and a multiplicity of uses and users. A recent Demos study in the UK supports this view (Mean & Tims, 2005, p. 10), arguing against “sanitised, frictionless consumer environments where architecture and technology are used to filter out undesirable people and groups.” As an illustration, the diagram below (Figure 1) sets out the author’s interpretation of qualities viewed as contributing to either more open and accessible or more closed and exclusive public spaces.

![City Space Quality Diagram](image)

**Figure 1. City Space Quality. Criteria for open versus closed environments (Source: Authors, 2015)**

**Case Study 1: Peter Barber Architects’ Donnybrook Housing, Bow, London**

Peter Barber Architects are a small London-based practice. Barber is the lead designer, supported by assisting architectural and administrative staff. Barber’s practice output has been referred to as “a far more convincing attempt at community building […] which deserves serious attention as a model for […] future development” (Woodman, 2007). His practice generally consists of urban housing with a few private dwellings, and homeless-care residential hostel clients in England.

Barber’s key housing projects since 2000 are primarily London-based, including: Doris’ Place (2000/2001) in Haggerston; Donnybrook Quarter (competition 2001, completed 2006) in Bow; Tanner Street Housing in Barking (2008); and Hannibal Road Gardens (2011) in Stepney. The practice was twice awarded the RIBA’s Building Design Architect of the Year prize for Housing (2007/08 and 2010/11), and has won multiple RIBA awards and commendations for its built projects. In 2012, Barber was appointed to the Olympic Park Quality Review panel by The London Legacy Corporation (London Legacy Development Corporation, 2012). Barber sums up his practice intentions in his manifesto: “We think that space conditions, and is in turn conditioned by, society and culture and that architecture can create the potential for social action and activity” (Barber, 2015).
Creating new public space: Donnybrook Quarter housing, Bow, London

Donnybrook Quarter (see Figure 2 and 3), is an award-winning housing and public space project in Bow, east London, described as having “redrawn the template for urban terraced housing” (Woodman, 2006). Barber’s design resulted from a 2001-2002 Circle33/Architecture Foundation competition “seeking innovative housing,” which Barber won from over 150 international submissions (French, 2002, p. 10).

Figure 2. Donnybrook Quarter, London. Aerial view (Source: Google Earth, Authors, 2015)

Figure 3. Donnybrook Quarter, London. (Left) Picture of completed project at Eden Way (Source: Authors, 2015); (Right) Picture of completed project from Old Ford Road (Source: Authors, 2015)

Donnybrook Quarter is atypical as a case study in some respects because the design and appointment began with the open competition rather than a fee bid or interview with potential clients, however the process of defining and defending social intentions through commercial pressures remains relevant. The project is an example of an increasingly common situation where both public land and previously publicly managed social housing stock are transferred from local authorities (Tower Hamlets in this example) to a private landlord and/or developer (i.e. Circle 33, who are both developer and a registered social-housing landlord).
Donnybrook Quarter was completed in 2006, after a series of design changes and challenges to the competition-winning scheme. Barber had previously completed only a few small-scale bespoke housing developments until the Circle 33 competition, therefore his ideas and aspirations had yet to be fully tested in reality. The final project delivered 35 flats, maisonettes, and houses with a mix of private and subsidized (social) tenures; 520 habitable rooms per hectare, which at the time was more than double the allowable density under Tower Hamlets planning policy (which had been capped at 247 habitable rooms per hectare) (French, 2002, p. 11). In conversation with the author Barber recalled that he thought it would not be built or would get “watered down” as the practice was required to work with “a really hard nosed kind of contractor,” Wilmott Dixon. While the scheme did change over the first six months, Barber notes that, rather than getting watered down, his practice “managed to actually intensify it,”

For some people getting into the real world, rolling their sleeves up, is just such a nightmare because they have to negotiate and they have to, you know, collaborate, and they have to, try to accommodate so many different points of view [...] but I'm always, I try to be positive and, as I say, an opportunist (Barber, 2013).

Overcoming challenges to accessible shared space

One of the challenges that Barber had to overcome between competition and completion was the client agent’s insistence that the project should become a more traditional “gated community” on the basis of estate agent advice that the private units would not otherwise sell. This change would have restricted access to the streets to residents only and the core area of the scheme would no longer be public space. Barber challenged this advice to the original client body and the final project result retains the competition vision.

That was a nightmare. Yeah, I mean it was slightly, slightly strange. The competition was set up with a real, you know, ambition but then it got handed over to, middle men, one particular guy who told us, you know, what the agent said [...] that our scheme, which we in the first instance said was a celebration of the public social life - that the street shouldn’t be a public street anymore. ((laughs)) So, I escalated it back to the people on the very top, on the board on the Housing Association, which is, you should never do that, you know, but it was the only thing to do, you know. [...] Some people wouldn’t have done it, you know, but, yeah, we had, we had to get it, get it right (Barber, 2013).

The suggestion to create a “gated” community is more often the result of economic assumptions for residential development over more general societal considerations. Architects working for commercial clients inevitably encounter such constraints in their practice and have to make choices about whether, or in what way, to effectively resist arguments in favour of more closed networks of space.

An example of a closed situation (not by Peter Barber Architects) is a project called Chronos (see Figure 4 & 5 overleaf), which is contemporary to – and geographically near – Donnybrook Quarter. It is also an award-winning residential development of apartments, maisonettes and retail/commercial space located on a corner site within a dense existing neighbourhood in east London (Sherwood, 2002). While the background to Chronos is outside the scope of this study it is included to illustrate the more typical outcome for urban residential projects where no public access is included in the final built scheme.
Reflecting on project outcomes at Donnybrook Quarter

Barber reflected on the possibility that his aspirations for Donnybrook Quarter could have also become a similarly gated development like Chronos. He said a gated outcome “would have been a great shame,” and noted that he was not under any illusions, even at competition stage,
that Donnybrook would have “streets full of people,” saying “it was never really going to be like that,” he felt the effort to keep open access was worthwhile (Barber, 2013).

[T]here’s a trickle of people that go through there, choose to kind of go through there, and choose rather than walk along the main road particularly at sort of school time, you know, people walk, mums, prams and kids and things like that which is a lovely thing to see [...] people kind of taking control of their environment, and it’s absolutely what you hope for (Barber, 2013).

As completed (see pictures in Figure 3, taken in 2013) Donnybrook Quarter maintains regular use as a public through-route, connecting the site to the surrounding neighbourhood and enlivening the interior “street,” which has been designed with doors and windows onto the shared space. The space has been maintained as a public street, now called Eden Way, with no restrictions as to who may or may not access through the site other than self-regulation. Barber spoke further about the success the project has had and what it means to his ability to promote more open accessible shared space in other housing projects:

Donnybrook replaced a building that sat in the middle of the site, it had loads of space ‘round it which nobody used and which was giving nothing. So I’ll say to the developers, I don’t think we need to build 5, 6, 7, 8 stories high, if we just, you know, just concentrate on covering the site, I mean really intense public space, this is a better way of doing it (Barber, 2013).

Barber is also pragmatic about the results, saying “architecture can go to a certain point, and then there are so many other variables, cultural and economic, social.” He notes however that the practice manifesto is on the front of every brochure and feasibility study the practice produces:

However hard-nosed the developer is, that’s in there [...] I’m not afraid to say to somebody ‘Are you sure? Because if we do that then that-’, it can be a logical conversation (Barber, 2013).

Case Study 2: MUF Architecture/Art LLP’s Barking Town Square, Barking, London

Muf architecture/art LLP is a multi-disciplinary collective of “contributing” architects, artists, designers, and researchers founded in 1994 by Liza Fior, Katherine Clarke and Juliet Bidgood. While muf has a track record of “architecture” outputs, including buildings, built installations, urban furniture, and the preparation of a number of urban development guidelines associated with architecture and urban design practice, it defies any typical characterisation in this regard. As an art practice, muf is particularly associated with site-based and publicly staged interventions; performative and participatory approaches to urban projects that challenge clients and given briefs with attention to visible and intangible qualities of public space. Their online practice profile states,

Access is understood not as a concession but as the gorgeous norm; creating spaces that have an equivalence for all who navigate them both physically and conceptually, muf deliver quality and strategically durable projects that inspire a sense of ownership through occupation (“Profile,” 2015).

In muf’s 2001 manifesto, This is What We Do, commentator Rosa Ainley wrote that “[t]heir focus on the process involves a recognition of the political context of how projects are constructed, and reveals complex attitudes to design and creativity” (Muf et al., 2001, p. 225). Liza Fior and Katherine Clarke trained in architecture schools and Fior is muf’s most visible architectural practitioner through her international profile of completed projects, and numerous writing, speaking, and teaching roles. However, throughout the practice’s history the founding partners have also explicitly “colluded with journalists’ projections of [them] as three women set apart from the architectural mainstream” (Muf et al., 2001, p. 09).

Most of muf’s completed and proposed work is within London’s east end boroughs and outlying suburbs, including key projects in Dalston, Hackney (Making Space), and both around
and inside the London Olympic Park (Hackney Wick), where they are part of the team developing Legacy community and residential projects (“Profile,” 2015). Since 2008, when the practice’s Barking Town Square design won the European Prize for Urban Public Space, muf’s profile and international recognition has increased notably within the UK professional architectural mainstream, and across international academic and philanthropic circles. With Clarke, for example, Fior was awarded the Louis I. Kahn Visiting Assistant Professorship at the Yale School of Architecture in 2009 and the practice was also commissioned to curate the British Pavilion at the 2010 Venice Biennale. In 2011 muf were awarded the RIBA’s Building Design Award for Public Realm Architect of the Year (“Profile,” 2015), and the US-based Graham Foundation’s included the practice as one of its prestigious 2014 Grant recipients (“Graham Foundation 2014 Grantees,” 2014).

**Leveraging shared space: Barking Town Square public realm, Barking, London**

Barking Town Square, completed in 2008, is in the centre of Barking, 10km from the City of London along the Thames River. It was awarded the 2008 Best European Urban Public Space prize (a UK first) as “a risky venture which, by means of a freshly conceived intervention, has transformed a formless space into a recognisable and meaningful place” (“Public Space,” 2008). The scheme originated from the London Borough of Barking & Dagenham’s (LBBD) efforts to address dereliction in Barking. According to LBBD, the existing site area was a “backland” behind the High Street consisting of a poorly used space in front of the early 20th century Town Hall, a 1960s library building, and extensive car parks (LBBD, 2003).

In 1999-2000 Barking received arts funding to improve its public realm, precipitated by the UK New Labour government’s Urban Renaissance initiatives, which included a shift in national development policy from suburban to urban investment-focused models. The funding led to an architecture/urban design competition for public realm and buildings in an existing area from the Town Hall to the High Street. The winning scheme by the developer Urban Catalyst with Avery Associates Architects, Gustafson Porter Landscape Architects, and artist Shelagh Wakely, featured an arc-shaped set of buildings with a mix of ground floor retail space, a new library and Gallery, residential units (See Figure 6). The proposed autonomous new building form culminated in a new central “town square” as performance space in front of the existing Town Hall. The surrounding spaces were treated as background servicing areas and car parks; more private “social” spaces were proposed as residential courtyards and rooftop gardens (LBBD, 2013).

![Figure 6: Barking Square, Urban Catalyst/Avery Architects scheme, 2000. (Source: LBBD, 2013)](image-url)
Between 2002-2005 Alford Hall Monaghan Morris (AHMM) architects replaced Avery Associates. During this time the UK government created the London Thames Gateway Development Corporation, an organization with powers to address large planning applications, including Barking Square, and to acquire land through compulsory purchase for regeneration (LBBD, 2013). As a result, AHMM’s 2002 scheme (see Figure 7) amended the original with more surrounding development, adding tall “gateway” buildings, and widened the central “street” as a “Library Square” to complement a revised “Town Hall Square”.

In 2005, muf were appointed as designers for the public realm, working with AHMM as building architects, and clients LBBD and Redrow, a commercial-volume housing developer who replaced Urban Catalyst. The key buildings and public realm works were completed over two stages by 2008, providing approximately 500 new residential units (see Figure 8). The public realm comprises “two-linked spaces: one empty, one filled” (Fior & Clarke, 2011, p. 337). A hard-landscape area fronts the Town Hall, while an “urban arboretum” consisting of 40 mature trees of 16 different species ‘fills’ the space between the refurbished library and new mixed-use residential/commercial/leisure buildings. Along one edge, a carefully detailed terrazzo-tiled arcade with bespoke light fittings ‘links’ the new Town Hall square and arboretum directly to the existing High Street (Carrera et al., 2010, p. 90).
Writing about the project, Fior (Fior & Clarke, 2011, p. 337) noted that muf's original commission was to create "a sunny space for new and existing communities to meet and drink coffee in the sun [...] a platform for social cohesion," which preliminary environmental analysis demonstrated was flawed because the new building proposals shaded, and directed wind into, the proposed open spaces.

This reading allowed us to make the first move to divide the site in two and make shady more shady, our understanding of public space not as an unremitting condition of cheeriness but the assertion that mystery, moodiness, and the desire to be alone have their place (Fior & Clarke, 2011, p. 337).

Fior also described how, through weekly meetings with AHMM the building footprint became a negotiable aspect, evolving along with the public realm (See Figures 9 & 10); "one building became two. Pedestrian routes, as rights of way, made their way through the site (Fior & Clarke, 2011, p. 337)." In conversation with the author, she expanded on this process:

[T]his took five years. When we started [play] was not on the agenda at all. It wasn't in the brief. In fact the developer didn't really want any play. [...] we worked really closely with the architects [AHMM...] and we were able to use public space as the excuse or driver, or power – an instrument, exactly – being able to use it as an instrument so the architects could use it as a way to argue to the developer that in order for them to get the planning they needed to listen to public space as being the driver (Fior, 2011).

She spoke about the process of negotiation as "Stage D-deep" (after the RIBA's Work Stage D for design development in a typical architectural project), saying, "So we invented Stage D-deep, when you make relationships, both public relationships through consultation and private relationships with those who hold the power for decision-making in earnest" (Fior, 2011).
Reflecting on project outcomes at Barking Town Square

Fior referred to the processes by which client and inter-agent relationships develop, and which afford practices like muf the opportunity to negotiate with and influence developers, as being fraught with challenges and constraints. She described the process as “unsolicited
research,” what she refers to as muf’s “enterprise,” when the practice chooses to work outside, and sometimes against, a commissioned brief:

So we get a commission for A, and we do F; because what we do is in fact we're interested in making space public- i.e.: making it out of the richness of more than one thing at a time, and questioning who the public is in the conversation, and making it available. (Fior, 2011).

That process, she said, can be both “accidental” (i.e. over the course of an architectural project you wait for opportunities to “tweak” a brief and make it “more public, more meaningful”) and it can also require conscious compromise (i.e. involving a choice to work with developer clients who might be adversarial to the public realm, and whom many ‘publicly’ and socially minded architects choose to avoid); “but in becoming compromised you get closer to the centre of the universe” (Fior, 2011).

I think the idea of quantifying value of, of being interested and not just being involved in administration is something we are attempting to do – trying to get paid for it in order to survive on that and carry on doing it (Fior, 2011).

CONCLUDING DISCUSSION

The accounts of both architects’ experiences in the above case studies suggest how architects in similarly dynamic and contentious private-led practice contexts can potentially increase their own influence and value by acting and using their design skills more explicitly. In Barber’s experience at Donnybrook and Fior’s at Barking, a more open “public” realm was resisted at first by the project developers because of potential economic liabilities to selling their private units. Fior’s and Barber’s experiences reflect how the constraints of working as architects for one’s commercial client and for the public realm can be approached as an opportunity to argue how a better quality (i.e., more open and flexible) public realm can be mutually beneficial; supported by empirical examples of economic success and qualitative recognition by the public and professional peers.

The examples do not provide a specific set of techniques or ‘easy’ routes to redress architects’ declining influence, however they demonstrate that greater open-ness and design quality can both enrich everyday experiences of urban residents while also providing real value to developers. The examples and insights reveal aspects of agency that can vary between approaching “negotiation” as an active, even subversive process compared to an “administrative” or instrumental acquiescence to practice changes and architects’ declining levels of influence in larger private-led decision-making processes. Among the themes that might be drawn from the interview discussions: intentions and tactics, and constraints and affordance relate to the paper’s argument that greater awareness of one’s intentions in practice can combine with tacit knowledge and skills to develop a range of tactics to take advantage of opportunities to subvert or influence market-driven constraints toward higher quality shared environments. As the interviewees acknowledge, working outside the status quo of traditional agency can be difficult to balance against the commercial reality of running an office, yet their experience also reveals an explicit understanding of their situation and their conscious intentions to continually connect their personal ambitions with their project/practice approaches.

Finally, the case study examples, while limited to specific contexts and practice narratives, support arguments that mainstream practice and practice training can learn to better appreciate the full range of aesthetic, economic, social, and other variables and actors that impact the delivery of larger-scale residential projects. Examples and discussions suggest that, while successfully influencing decision-making processes cannot be guaranteed through any combination of tactics, the potential exists to (re)frame the way architects understand their creative instrumental knowledge toward a more transformative critical praxis when engaged in private-led urban development and larger-scale residential projects. Compromise, complicity, and
participation in the contexts of private urban development are terms to be reconsidered with new meanings as tactics to engage clients and contentious projects. Further research aims to investigate the extent to which individual intentions for more critical and socially-minded practice can transfer to more mainstream architectural approaches and training, to better address market-driven and private-led decision-making processes.

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HIGH FLIGHTS AND HARD LANDINGS: 
THE ADVENTURES OF PLANNING FOR THE REGENERATION OF 
THESSALONIKI'S DERELICT WESTERN ENTRANCE

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Abstract
The aim of this paper is to highlight the several phases of the post-1985 planning endeavours of Thessaloniki, in the context of which the Lachanokipoi area of the ‘Western Entrance’ of the city is particularly examined. Our underlying research has shown that one can distinguish three periods in the planning of the city which are characterised by three different major planning trends, all related to and reflecting major phases in the country’s development – especially its economic trajectory. The paper attempts to put the issue of the Lachanokipoi area in the context of potential urban renewal in the area; this would be as part of the general spatial plans for the city, considering the Lachanokipoi area as an urban brownfield, for which comprehensive integrated plans have to be made.

Keywords: urban planning; Thessaloniki; western entrance; Lachanokipoi; Greece

INTRODUCTION: a chain of problems leading to problematic city areas
It is no coincidence that the recent economic crisis is synchronous with the settlement of the majority of the global population in urban centres. The unprecedented urbanisation of the last half of the 20th century, the abandonment of rural space, and the problems this has caused cities both combine to create high levels of complexity in urban socio-economic structures. This is more evident in mega-cities or urban areas of more than 10 million, such as Tokyo, Jakarta, Seoul, or Delhi and Shanghai; these mega-cities are increasing in number. This produces complex, huge global restructuring, especially if combined with changes in the wider production processes and spatial division of labour. New phenomena are emerging, such as the rampant energy-consuming industrialisation of countries such as China and India. In parallel, climate change, desertification and the rise in ocean water levels, presumably to a large extent related to these developments due to the change of the production regimes, all serve to accentuate the problems. The threat to global population of ultimately living in slums and continuing impoverishment has to be seriously considered.

Given the above developments, to a large extent caused by production restructuring, industrial restructuring has consequently been an expected outcome. This is not really news. In the early 1970s, after the oil crisis, the economic crisis was felt around the globe. Yet this was not merely because of the oil crisis. It was also due to the completion of a whole cycle of post-war

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growth and development regimes, and had started earlier in various guises with challenges of the established post-war order, with urban and political movements, such as May ’68. The changes that followed were expressed in the production structures and encompassed all aspects of social life: they marked changes in the mode of regulation of the accumulation regime. It was that period which signalled the departure from Fordism and the move towards post-Fordist, more flexible, accumulation regimes (see Piore and Sabel, 1984; Tolliday and Zeitlin, 1986; Roobeek, 1987). This could not leave urban and rural space unaffected. The gradual transition was accompanied by spatial restructuring that was made necessary in order to reflect production restructuring and new labour divisions, as is well documented in the very up-to-the-point discussions of the 80s (Lipietz, 1986 and 1987).

The revolution of standardisation/containerisation, which changed the specifications of sea vessels, led to the abandonment of traditional ports, such as the London Port; this in turn left behind vast derelict spaces, such as the London Docklands (Levinson, 2006). Similarly, the related crises in shipbuilding, and in the coal mining and steel industry, disorganised the production structure of cities such as Bremen (shipbuilding, cars), and Sheffield (steel and heavy engineering), Bilbao (heavy manufacturing, metal), Torino (cars), St Etienne (steel and engineering) (Power, Plöger, & Winkler, 2008), Newcastle (shipbuilding) and Malmö (engineering, shipping, textiles and cars), which had to adjust or to find new roles and specialisations, something which presupposed or resulted in new spatial governance. This transition period in several cities followed the general transition of the world economy, strongly influenced by the collapse of the centrally planned economies of Eastern Europe. The crisis of cities continued in various forms throughout the post-oil crisis (1974) period, and has continued virtually to the present day in various forms and with different focal points. This could not have happened otherwise, as cities are the engines of countries and in a way are the locations where the key problems of the economies are vibrantly manifested. Frequently, the response to the crisis of cities has taken the form of urban regeneration or renewal, leading to gentrification. In different cases, cities such as Dubai and Doha have literally emerged as global centres out of exactly this international conjuncture. Doha, in particular, was marked with passing to its second development phase with rapid urbanisation, starting a trajectory from a pre-oil settlement to become a globalised hub, pursuing to become part of the global knowledge economy in a setting of urban space diversity (Wiedmann and Salama, 2013 and Salama and Wiedmann and 2013).

The economic restructuring during the period from the oil crisis (1974) up to the now has by and large been based on the idea of neoliberalism involving deregulation, liberalisation and the privatisation of public entities along with globalisation. It is precisely the latter that allows for easy exportation of crises along with the exportation of goods.

Today’s crisis (post-2008) started with the housing issues in the US and reflected the response inability of a system that was globally challenged. Yet, in the case of countries in the ‘south’ of the developed world, such as Greece or Portugal, the situation was proven to be much harder, as these countries are in a sandwich situation: above them are those countries that over the years have become more competent and have managed to achieve high technology and quality production, whilst below them are countries that are still lagging behind, still attempting a transition from a rural ethos to urbanism and industrial production, and still offering very low cost production factors. In the middle are countries like Greece which cannot compete with the former but can also not dive to the level of the latter, thus having very small chances to survive, entangled in the tentacles of a complex – almost cutthroat – competition3. This is expressed in a fall of exports, in unemployment, in redundant spaces, in abandonment of spaces and

3 According to OECD data, in 2012, Greece, in terms of GDP per capita at current exchange rates, was 24 among the 34 OECD countries, while in close positions were Spain, (22), South Korea (23), Slovenia (25) Portugal (26). First was Luxembourg, (1) Norway (2), Switzerland (3) and Australia (4), while the last 4 positions featured Poland (31), Hungary (32), Turkey (33) and Mexico (34). http://en.wikipedia.org/wiki/List_of_OECD_countries_by_GDP_per_capita
businesses in the centre of cities, and in the impoverishment of the urban population, as well as in the accentuation of social disparities. In Greece, combined with large numbers of illegal immigrants from poorer countries, the situation of urban living is made explosive and the urban space of the large metropolitan centres (especially Athens and Thessaloniki) is highly problematic.

Part of this problem is manifested in what have been called brownfields⁴. Yet brownfields are not something exclusively new. They are closely related to changes in the modes of production and technology. They are also related to the expansion of the territories of cities, especially in the cases of urban sprawl, where these are expanding in a non-programmed way in all possible directions. In this situation, they enclose spaces which become brownfields. So it is not only closures related to economic crises that cause brownfields, but also industrial relocation due to the cities' expansion, which in turn could be due to urban flourishing, and possibly related to new urban plans. However, in cases like Greece this is rather more seldom at the present time. If manufacturing industry itself migrates to lower-cost places, then the places that today host this industry are in danger. In the case of housing and tertiary sector activities, the centres of the city spaces are in danger of degradation, closures, and abandonment.

Various proposals have been put forward for such cases, ranging from purely architectural to entirely social; the former is based on the rationale that high aesthetics, urban design and management can mobilise social reflexes and lead to socio-spatial changes. Such has been the case of Barcelona “where the effectiveness of small-scale projects of urban reform were proposed as an alternative to the abstraction of conventional planning and large Master Plans, as a means of overcoming the limitations of planning through architecture” (Grichting, 2013). The latter follows the rationale that only social interventions are meaningful and that spatial restructuring can only be an outcome as a result of these. In either case, it is acknowledged that planning (with whichever meaning in each case) is a crucial factor for spatial change, while, as Wiedman and Salama argue, urban governance seeks development strategies based on social, economic and environmental aspects in order to guide urban growth (Wiedman and Salama, 2013).

The case of Thessaloniki’s ‘Western Entrance’ (WET)

It is therefore planning that we deal with in this paper, rather the attempts and prospects of planning for a brownfield area in the city of Thessaloniki, in Northern Greece (Figure 1). Methodologically, this is done by detailed document analysis of all plans carried out for the city and the wider area since 1985, by extensive informal discussions with the authors of the plans and by close observation of the area.

The phases of planning corresponded to different phases of the production structure throughout the country’s developmental phases, together with the relevant philosophies and visions that were projected at each time.

This is exactly the case with planning in Greece, and no less so with Thessaloniki, the second largest city in the country. Thessaloniki, since its annexation to Greece in 1912, for most of the 20th century has been an industrial city which has undergone all economic phases that Greece has gone through, including the post 1974 oil crisis shock and the progressive de-industrialization of the eighties and nineties. The gradual change of the economic profile of the city had spatial impacts among which the abandonment of industrial spaces.

The reason we deal with the post-1985 period, is that this was the year when the first regulatory plans were carried out in both Athens and Thessaloniki, and a year which signalled a new phase in spatial planning in Greece, including a relevant Law. The area, for which this

research was conducted, is the ‘western entrance’ of the city, specifically the part of it referred to as Lachanokipoi.

Figure 1. Thessaloniki in Greece (Source: based on Kyratzakos, 2014)

Western Thessaloniki (Figure 2) is densely populated and comprises expansions of older refugee settlements (Christodoulou, 2008:11). Immediately before the outbreak of the recent Greek crisis, in 2010, this part of the city was already characterised by higher unemployment rates (on average ~6.5%) compared to the central and eastern parts of the city (on average ~4.1%)\(^5\). Lachanokipoi (Figure 3) is not an exception to the western part of the city, but data is not currently available at this level. Social problems and spatial degradation are present. It is a 280 ha area belonging to the municipality of Menemeni. It includes 15 ha of the port and 435 ha comprising buildings, of which 190 are old industrial structures and 99 are abandoned (many of significant historical value). The dominant land uses are mixed, comprising light industry, commerce and transport, while on the northern side the area is to a certain extent residential (Stathakopoulos, et al, 2009: 229).

The area is dominant along the western entrance. Transport–wise it lies in a very privileged location, adjacent to the port and at the end of the major national motorway that leads from Athens to the northern borders. It is also adjacent to the railway network. Yet, its current image as a derelict space is degrading the image of the city in an era when image is all-important for inter-urban competition. Part of the problem is that on the western edge of the area, and also by the Dendropotamos River estuary (Figure 4), bordering the area on the west, the industries that are located there (oil reservoirs) fall under the SEVESO II\(^6\) EC directive regarding chemical accidents-hazards. The area is, to a large extent, abandoned and has gradually been converted into a brownfield. Yet, it has a small number of inhabitants and suffers from poverty, criminality,

\(^5\) Unemployment for the whole of Greece was in the 4\(^{th}\) quarter of 2010 14.2% while during the 3\(^{rd}\) quarter of 2014 it climbed to 25.5% (see http://www.statistics.gr/portal/page/portal/ESY).

\(^6\) For a full concise account regarding SEVESO, see http://ec.europa.eu/environment/seveso/
and prostitution. Indicatively of how the market reacts, it has in parallel shown signs of urban renewal, such as hotels, pockets of administration, and a museum; some businesses have appeared, literally next to the ‘degraded’ uses. The absence of solid planning, apart from certain top-down interventions such as the erection of certain buildings to host government and cultural activities, have not been enough to change the scenery, and are very topical and small interventions in a complex territory, which to a large extent comprises an urban brownfield.

![Figure 2. The Urban Agglomeration of Thessaloniki and the Study Area](Source: based on Kyratzakos, 2014)

A detailed study of the post-1985 numerous plans made for this area (originating either from the central state or from the municipalities, especially of Thessaloniki) has revealed a great diversity in terms of strategic conception, the scale in which plans are conceived (and hence the level of detail they reach) and the sectors they deal with. But yet, something which was also brought to the surface was the relation of the plans with the general ambience, with the economic and political environment within which they were carried out and the goals they set. It is important to note that the only plans resulting from the institutional framework were those of the Regulatory (Master) Plan, of the City Master Plan (see below) and those connected to European funding (Community Support Framework and its ‘successors’). The rest were conducted by various city agents in an effort to articulate a valid opinion on the future of the city. A deep study of the plans made for Thessaloniki\(^7\), and an effort to locate parts of them dealing with the area, revealed that the general plans for the city and the region say very little for the particular area; what is said are rather generalities. Of course, this is not the case for the special plans commissioned for the area. It is to these plans we turn now presenting them according to the three eras identified.

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\(^7\) See in detail Skayannis and Kyratzakos, 2014.
1985-2000: The period of low expectations

This period was actually the period of impressive development in Greece, with two very important characteristics in terms of planning. The Community Support Frameworks (CSFs) were implemented for the first time (since 1988); their implementation met with a lack of European Union co-finances of public investment projects. The name CSF has changed over the years.
experience in both the programming and materialisation phases, in priority setting, etc., notwithstanding mismanagement and lack of appropriate appraisal. The second important development that affected Thessaloniki was the transition of the ex-centrally planned economies of Eastern Europe into the free market. On one hand, this resulted in the opening of borders, migration flows and an influx of tourism in the neighbouring Chalkidiki. On the other hand, it raised the expectations for investment opportunities abroad, and supported a new national narrative on Thessaloniki being the ‘capital of the Balkans’. This idea characterised most conceptions for the development of the city for the next two decades, yet by and large has remained a vision (see Bakis and Skayannis, 2013).

However, the national planning and development priorities (channelling of European funds) and the lack of adequately organised structures did not make space for the city to develop as expected. It is not coincidental that the people in Thessaloniki refer to the Greek state as ‘Athinocentric’. This, despite the shallow popular enthusiasm, was expressed in the plans that were quite realistic when compared to what was to transpire later on. The plans for the Lachanokipoi area in particular were no exception.

From the beginning of the period, and for some time since, plans for the Lachanokipoi area have moved into two directions: a) towards the residential development of the area, with consideration for green and open spaces and some supportive activities; and b) towards the conversion of the area into an entrepreneurial park.

The former had been proposed by “The Regulatory (Master) Plan (RMP) of Thessaloniki” (YPECHOIDE, ORTH, 1985) and “The City Master Plan” (CMP) (1993) (study since 1987) (Municipality of Thessaloniki, 1993).

In the RMP there is no indication for any specific measures for the area under consideration apart from the general statements about the western and industrial parts of the city. From reading the proposals, it can be ascertained that the planning of the area consists essentially of regeneration and residential development. The CMP foresees residential land uses, open spaces, light industry and various uses for the city centre. In particular, the gradual relocation of wholesale uses from the urban fabric to the three city entrances (i.e. also to WET) is included in the general proposals of the CMP. In parallel, the plan calls for the cessation of disruptive uses and the designation of the space for residence, a local centre, green area, sports, parking and port installations.

The latter had been proposed by the Kafkalas et al study (Report for the Region of Central Macedonia) as early as 1993, entitled “Strategic Choices for the Development of Thessaloniki”, and the Papamichos et al study (1995) “Thessaloniki in the 21st Century” (commissioned by YPECHOIDE/ORTH). In Asimos et al, 2010a, it is mentioned that the Kafkalas 1993 study denotes the area as a pole for tertiary activity of a city scale; it also proposes the refurbishing of the urban morphology and symbolism, signposting an entrepreneurial city. Similarly, the Papamichos study proposes the locationing of a tertiary pole in precisely the same area (Asimos et al, 2010a).

It is interesting to note that the starting point for all studies was the residential land uses, and that while YPECHOIDE, via a new study, accepted a shift of this approach as manifested in the Papamichos study, the Municipality in the CMP remained committed to the residential idea, not influenced by the Kafkalas study that had run in parallel. This is indicative of the fact that the Ministry of National Economy (in charge of the proposals of the region of CM, for all practical

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9 The beginning of our period is the first Regulatory (Master) Plan (1985).
11 YPECHOIDE was the name of the Ministry of Environment & Planning during that period (later YPEKA).
12 ORTH: Organisation of Planning and Environmental Protection of Thessaloniki, responsible for the Regulatory (Master) Plan of Thessaloniki.
13 City Master Plans (CMP) are one level lower than the Regulatory (Master) Plans (RMP). They concern parts of the former, usually one municipality of the agglomeration, and are more detailed than RMPs. They have to observe and specify the guidelines of RMPs.
purposes), and the Municipality did not have a common strategy for the city during the same time period (1993). It also reflects the rigidity of spatial planning regulations and conceptions in Greece, as opposed to the more flexible approaches of the economic ministries (which deal with the structural funds of the EU).

This period of fairly modest ideas failed to see the opportunities for the place, only gradually becoming fully aware of the opportunities it potentially offered; it succumbs to traditional rigidities, indecisiveness, political manoeuvres (probably) and negligence of the Thessaloniki issues on the part of central government, notwithstanding the possible inefficiency of the local actors. In this sense, threats have translated into reality and the strong points of the area have not been utilised. It is not surprising that major plans were actually not materialised. An exception was the case of the ‘Thessaloniki cultural capital of Europe’ endeavour (very much debated in terms of its management), in the context of which several urban interventions were implemented, such as the conversion, restoration and use of storehouses in the port and of historical buildings (Giakoumakatos, 1998). A small number of buildings were restored and converted in the Lachanokipoi area during this period, such as the VILKA factory, the Nussias tannery, the Mylos factory (Figure 5), the Fix breweries, and the municipal slaughterhouses (Figure 6), all now operating as cultural and entertainment centres. Yet these interventions were topical, not reaching the scale required to meet either the goals of the plans nor the change of the city’s profile. It is however this atmosphere that had been created which perhaps paved the way for the subsequent period.

![Figure 5: The Entrance of 'Mylos', Lachanokipoi, Western Thessaloniki](source: Authors)
2000-2010: The take-off of the phantasmagorical planning

The second period 2000-2010, reflects the indicators of the good development and growth experience in the previous period, the optimism related to the Olympic Games and the fantasy of continuing development in the post-Olympic era, the search for extroversion of the country and the special role Thessaloniki could have in this, especially in the search for a multidimensional entrepreneurial activity. Yet, the largest part of the pie still remained with Athens, especially before the Olympics (2004). Very special developments worthy of note were the adoption of the Euro (1st January, 2002) and the decline of the infrastructure investment around 2001 (when all Olympic projects were already running) while the GDP of the country was still rising. The period in terms of political discourse signalled a ‘revenge’ of Thessaloniki against Athens. Bypassing city planning, projects were announced, such as the subterranean motorway link of the gulf under the sea, the metro, several highways, etc., mostly related to infrastructure – the expenditure for which, as mentioned, was in decline.

The study “Strategic Planning for the Development of Western Thessaloniki: Physical-regional and entrepreneurial approach on the basis of transport infrastructure” (Prefectural Administration of Thessaloniki, 2000) in the euphoria of the period (forthcoming Olympics in 2004, Greece entering the Euro-zone and the Euro in 2000, economy growing, etc.) argued for the area (the wider area, in fact) to become the gateway to the globalised market, proposing all ideas that had been articulated thus far, such as the relocation of the International Fair, the bid for the EXPO, the relocation of the airport, the construction of the tunnel under the sea, and so forth. This maximalist approach carries the obvious underlying assumption that the phenomenal expense that such a project would require would be covered by the public sector with the assistance of European funds. The invocation by the authors Angelidis and Manos (2002) of some opportunities for Western Thessaloniki (not explicitly for Lachanokipoi), namely cheap land, the specialised but inactive (re: unemployed) human resources (re: labour force) that could trigger development processes, however, is not an adequate argument vis-à-vis the immense budget required.
The two studies that followed in 2002 did not (on the whole) deal with specific areas of the city, but were rather of a more general strategic nature. “The Strategic Sustainable Development Plan of the Wider Thessaloniki 2001-2010 – Action Plan” (Kafkalas et al, 2002) was commissioned by the Ministry of Macedonia and Thrace, the Region of Central Macedonia, and ORTH. This plan does not especially deal with geographical districts of the city, such as the western part or the western entrance. It provides strategic directions for the future of the city as a whole, along the following priority axes: a) international role and cohesion of national territory; b) competitiveness and innovation; c) social cohesion and equity; and d) ecological balance and quality of life.

Further on, the “Study for the Urban Control Zones beyond the lines of the Plan and external to the borders of the settlements of the peri-urban belt of Thessaloniki” (Michailidis et al, 2002; cf. Michailidis, 2003, pp. 166-182.), for ORTH, acknowledges problems for the development of the secondary and tertiary sectors, which are reflected in the area, such as the insignificant long-term development trends of industry, and the indications for de-industrialisation, or the traditionality of the service sector. It also emphasises the need for the restructuring of the tertiary sector so as to combine commerce administration, and exhibition activity. Regarding what might be relevant for Lachanokipoi, it concludes by proposing (amongst other things) a transport and network node.

The plans for the major transport infrastructure node (both at international, national and local level) gained pace, and the “Regional Frame of Physical Regional Planning and Sustainable Development of the Region of Central Macedonia” (Region of Central Macedonia, 2004), during the same period, focused on such prospects as incorporating the port into the overall picture and suggesting its opening up towards the city (and surrounding area). Nothing special appears among the proposals of the regional framework, apart from the fact that the area is considered as a transport hub on the basis of the development of the port. In parallel, the environmental issue is raised in a more decisive way (as climate change issues have come more and more to the fore in public debate). The complexity of the problems led to the suggestion of the integrative new tool of SOAP14 which, however, remained just a proposal. This euphoria reached its apogee just before the outbreak of the Greek economic crisis, with the Stathakopoulos et al (2009) study “The Investigation of the possibilities for the optimum urban development and utilisation of the area of Lachanokipoi (Phase E)” incorporating among its suggestions the creation of a land extension Dutch-style, and arguing, practically, that an entrepreneurial park should be the future of the area. The study aims at balancing east and west: it proposes a high standard tertiary sector – an entrepreneurial park of 41 ha (including the creation of a new space of 19.3 ha from land reclamation, gained by banking up towards the sea side), 75% private offices, 10% city-centre uses, negligible residence (400 inh.) and limited park and open spaces (8 ha). It also foresees new transport infrastructure projects and some urban regeneration undertakings. The study also argues that a new city plan and subsequent studies are required (see Asimos, 2010b, pp.182-189).

This study was backed by “The Single Strategic Transport Infrastructure Plan of Thessaloniki 2020” (Ministry of Infrastructure, Transport and Networks 2010), foreseeing fixed track line extensions to the west yet not necessarily up to the Lachanokipoi area, and the conversion of the ‘new railway station’ (adjacent to Lachanokipoi) into a multimodal transport hub.

Compatible with the above was a further Stathakopoulos study “The Structural Plan of Thessaloniki and its Wider Area” (Stathakopoulos, 2010), which gathers all the previous valuable and still-pertinent proposals, as well as including new ones. It also particularises binding issues of the RMP (idem, p.7), apart from the unrealistic ones that involved high budgets (idem, p.9). This study proposed that Lachanokipoi should be redesigned as an entrepreneurial park (idem, p.14) and includes proposals for the port, the metro and the tram.

14 SOAP: Integrated Urban Interventions Plan
During this period, it seems that threats (besides the very thorough examination of the SEVESO II issues) have not been calculated, as far as the macro level is concerned. The studies make an effort to capitalise on the strong points and take advantage of opportunities, but fall short in terms of correctly anticipating the economic pitfalls and threats. In a city that has suffered from ill-thought planning (early metro attempts, the bad pace of the on-going metro construction, and the failure of the ill-planned [town planning wise] tunnel under the sea), the creation of new land into the sea is rather an unrealistic prospect, and the same applies to a major bridging of the Gulf similar to the bridging of Copenhagen to Malmö, in the context of the highly problematic financial situation of the country. On the other hand, an effort to valorise construction capital after the Olympic works has been fairly inactive in Greece, and this faction of the capital has already tried to seek valorisation prospects abroad. In addition to funding complications, bureaucracy and inefficacy of programming have undermined the progress of the major projects (except some topical ones, such as the intercity bus station ‘Macedonia’ inaugurated in 2002 and the upgrade of the peripheral highway in 2005), and certainly did not leave space for the regeneration of the Lachanokipoi area during this period. In the wider area of Lachanokipoi, a new highway was created (2004) linking the PATHE motorway\(^{15}\) to the centre of the city, passing close to the intercity bus station, while the Georgiou tannery was converted to become in 2005 the Porto Palace Hotel (Figure 7), and the conversion of the old pump house of the Thessaloniki Water and Sewage Company, which from 2001 has operated as water supply museum.

![Figure 7. Porto Palace Hotel, Lachanokipoi, Western Thessaloniki (Source: Authors)](image)

### 2010-today: The period after the crisis: a forced hard landing?

The third period (post 2010), the period of the crisis, reflects a shrinking economy where the problems are looked at through a magnifying glass. Justifiably or not, the dream of Thessaloniki as a capital of the Balkans collapsed, and the optimism from the Olympic Games vaporised. In a context of shrinking GDP, unemployment has rocketed, business investments are still sought, political instability is present, and privatisations are on the daily agenda yet not particularly successful.

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\(^{15}\) PATHE: Patras-Athens-Thessaloniki-Evzonoi; the north-south motorway of Greece.
After the outbreak of the Greek economic crisis, it seems that the expectations for the entrepreneurial phantasmagoria tend to have come back down to earth. The new RMP “The Study for the update of the Regulatory (Master) Plan (RMP) of Thessaloniki” (ORTH, 2012: draft Law) does not include the land extension of the previous study and seems more modest in regard to the entrepreneurial prospects, making some effort to include (for the wider west area) other industrial uses, such as manufacturing and wholesale businesses. Its follow-up, the “Thessaloniki 2012 Programme” (ORTH and YPEKA 2011) explicitly suggests, though, that the Lachanokipoi area should become an entrepreneurial park, as one of the seven major urban interventions. Obviously, the whole enterprise is left for future studies and for the lower planning levels to materialise, such as the on-going “New Master Plan of Thessaloniki, second Phase” (Municipality of Thessaloniki, 2014), which will prepare the ground as an institutional framework for all possible new land uses, relocation of conflicting land uses, and all possible necessary regulations, legislation, etc.

Finally, the remarkable “West Challenge” project (Aggelopoulou, and Bartziokas-Tsiombras, 2011) seems to be heading in the right direction, being quite balanced and realistic with a good grasp of the possibilities of the period. Its six clusters make sense, though it is questionable as to whether the rigid boundaries would be a realistic and desirable option. These clusters comprise an entrepreneurial park, culture and recreation, China Town, licentious neighbourhood, residence, and urban environmental garden. This plan has also been linked with ideas for the promotion of the city in terms of place marketing (Aggelopoulou et al, 2012).

In parallel, in the current, valid transport master plan for 2020, there are various proposals for the improvement of the western points of access to the city, but not for Lachanokipoi. The discussion about transport improvements limits itself to the improvement of the conditions of the internal ring of the city and the extension of the metro lines, yet not through Lachanokipoi but to the north of it. On the contrary, (some) of the proposals foresee a tram reaching the area of Menemeni, which is adjacent to the Lachanokipoi area. In addition, there is a proposal for one of the major parking lots to be located in the area.

The crisis seems to have brought a certain degree of realism. Strong points and weaknesses tend to have been taken into consideration in a more realistic way, judging by the more pluralistic attitude towards future land uses and by the pull-back from the most expensive plans, which carried a potentially precarious and high risk result. It is not yet apparent whether threats are being taken into account (though down to earth proposals incorporate a degree of threat mitigation), while opportunities seem to be being given serious consideration. It is encouraging in this context, though at a micro level, that in the very heart of Lachanokipoi the old gas factory has been converted into the new headquarters of the regional authorities of Central Macedonia (Figure 8), a complex of buildings currently (early 2015) under completion. Being a top level administrative-governmental intervention, this might trigger a constellation of activities for the area, but most importantly it signals the interest of the administration in the area and possibly a mandate for future re-development.

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16 YPEKA is the current name of the Ministry of Environment & Planning (previously YPECHODE).
CONCLUSION – Proposal for the strategy of interventions

As our analysis of the documents and plans has revealed, there have been interesting studies and planning proposals related to Thessaloniki and the problematic area of Lachanokipoi, some quite inspiring, all being placed in the historical context within which they were carried out. They have all tried to tackle the problems, suggesting a series of measures on several domains.

Planning as a process and the planning product itself, the plan, are products of social processes in the general sense. In many cases, planning is dictated by governments and the participation of the civil society in whichever way is iconic; in some other cases, social participation is more real. But even in the cases where the outcome of planning is top-down inscribed, these directions reflect (express) a particular crystallisation of controversial (to a certain extent) forces in society that create an ambience, show a will of key actors where do they want society (in spatial terms) to head. This is in spite of the role of planners themselves, who frequently indulge in over-planning, whether consciously or not. In the case of Thessaloniki, the dominant planning outcomes in the various periods reflect governmental choices which were made in support of economic interests yet rather reflected wishes for the future than realistic prospects, as well as also reflecting an atmosphere for the creation of which the political world was by and large responsible, or in certain periods, reflected what Rapoport would call the handicap principle of extravagant construction to communicate power and impress people (Rapoport, 2008).

Whichever the case, planning in Thessaloniki remained at the level of wishful thinking and has not reached the level of detail required to make substantial subversive changes that would have a real impact on the city’s development. This is except for big projects which, however, are now stalled because of bad programming, such as is the case of the metro. What is missing is the dialectics between a realistic strategic plan and the detailed area plans, yet not from the physical planning point of view but seriously taking into account the socio-economic aspects in order to make such a plan.

This reflects directly on the plans themselves: as evident from the analysis above, the planning of the area, at the very ‘planning’ level, has faced certain major problems: a) planning...
tools were not adequate enough and planning was taking place whilst only partly facing the
problems i.e. from a general land use planning perspective in combination with transport plans (in
the best case scenario, with a certain compliance with each other)\(^{17}\); b) though in some cases
budgets were roughly calculated, the sources of the funds were by and large expected to be
provided by external actors (such as the EU), while the idea of fund leverage by private investors
was not embodied into the planning processes; c) questions of social concern, such as poverty,
professions, etc., were not addressed under the understanding that ‘development’ will become a
panacea and will solve the problems.

Consequently, the policies (if any) that have been so far rolled out over the area have not
managed to revitalise/regenerate it. The ‘invisible hand’ of the free market, in the absence of a
robustly articulated policy at the local level, has provided its own solutions, creating a mosaic of
conflicting land uses and maintaining pockets of poverty and derelict spaces adjacent to red light
services, two high class hotels and cultured recreation facilities.

Yet this is not what is required for the area. Most planners would agree that a regeneration
scheme should exert an effort to make the area as safe and operative around the clock as
possible, as well as making it ecologically sound and economically vibrant. A pragmatic plan for
the area would be one that would take into account both social and physical dimensions of the
problems and propose equally multidimensional, yet realistic, solutions in the context of a vision
for the city’s future. This of course cannot be decided in the absence of an opinion from all
interested parties, among which would be included the local population of the wider area as well
as of the specific area of Lachanokipoi.

However, a deeper understanding of all these situations calls for a combined answer to the
problems, a kind of multi-tasking exercise, an integrative plan which would be strong enough to
set the rules even for the City Master Plans. This kind of opportunity was not present in Greek
planning Law until the SOAP tool was devised, especially its guidelines in 2012\(^{18}\). The first pilot
SOAP study was carried out for the Centre of Athens by our team of the University of Thessaly
(Economou, et al, 2014) and has already revealed its own possibilities. The relevant ministerial
decision\(^{19}\) was signed early in 2015. Such a project would/should follow the SOAP logic of
conducting a thorough analysis of the field, and is expected to make composite proposals that
simultaneously tackle a multitude of problems beyond the classical town planning problematique.
So, hypothetically, it is possible at the same time and under the same set of measures to propose
a change of land use with economic regulations, incentives and education, while taking measures
for the environment.

The planning trajectory that has to be followed should combine realism with vision. *Realism*
means abandonment of the maximalist dreams of the second period, and *vision* means
disentanglement from pessimism that nothing can be done. The later work of Aggelopoulou, and
Bartziokas-Tsionbras (2011) (see above) and Kyratzakos (2014) as reviewed in Skayannis and
Kyratzakos 2014, is along the lines we describe.

To this end, the strategic goals must incorporate economic and spatial regeneration and
development, social cohesion, justice and equity for the improvement of quality of life, and for
environmental protection along with aesthetic upgrading. All of these are essentially equal
partners as constituents of sustainability and would combine to face the crisis from a ‘sustainable’
point of view.

According to the authors, in terms of goals and targets, the practical proposals towards
sustainable planning should comprise gradual facing of the SEVESO II problem and targeting to

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\(^{17}\) This has generally been the case in Greece. As Skayannis notes, there has been a multitude of proposals to face the problems
of the crisis ridden Centre of Athens, yet almost all were partial, either purely ‘sociological’ or ‘economistic’ or of solely an urban design
nature, seeming not to comprehend the complexity of the problems hence the requirement for composite solutions (Skayannis, 2013).

\(^{18}\) The SOAP guidelines were set by Ministerial Decision [MD] 18150 on 24-4-2012.

\(^{19}\) Government Gazette (16/01/2015).
host transitory (as opposed to permanent) population, a business park especially geared to logistics and innovative industrial and service activity, preferably in the area of shipping, finance, and maritime businesses. These activities, and the implicit land uses, should be complemented by a multitude of other uses, including pockets of cultural and hospitality uses (hotels already have picked up in the area, while certain sophisticated recreational establishments have been there for some time), and a pocket specialising in administration (supporting already existing projects, such as the relocation of the headquarters of the regional administration of Central Macedonia) (Skayannis & Kyratzakos (2014).

It is up to those political decision makers, be it the central state ones or in the regional or municipal administration, to undertake the responsibilities and play their role for the future of the city and the particular area. However, it has to be stressed that in today’s context the planning of the city and the area should only be conceived in the frame of metropolitan planning, as the kind of development and the complexity of the city and its wider area do not allow for any sort of compartmentalisation.

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A HOLISTIC RESEARCH APPROACH TO MEASURING URBAN IDENTITY: FINDINGS FROM GIRNE (KYRENIA) AREA STUDY

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Abstract

As cities are losing place identity under the influence of industrialization, technological advancements and globalisation, a key task for mainstream politicians, urban planners/designers and residents is to understand what makes a city unique and recognizable. As urban identity is formed not only through identifiable and memorable formal attributes, but through the meaning attached by the users of the city, there is a need for a holistic approach integrating objective measures achieved through pre-analysis of the urban environment, and subjective measures achieved through user surveys. This study, based on such a holistic research framework, aims to measure the urban identity in Girne (Kyrenia), using survey data with a sampling of 250 participants, following a pre-analysis of the town. The results of the analysis indicated that although historic landmarks are so powerful in constructing the urban identity, traditional urban pattern and social life have not been found significant in constructing the images of the city unless they are frequented by local residents. On the other hand, the new housing developments lacking locally appropriate architectural and contextual qualities do not influence the urban image at all. Further, as the findings revealed that the perception of urban identity changes in time, there appears an opportunity to regain and/or enhance identity through various strategies. These include urban design strategies that depend so much on the specific context of a particular area, including all environmental dimensions defined in the paper.

Keywords: Urban identity; holistic approach; local urban context; character; change; user survey.

INTRODUCTION

It is often argued that any place should have its own ‘identity’, a key concept that is defined as ‘the distinguishing character or condition of a person or a thing’ (Webster’s Ninth New Collegiate Dictionary, 1983). Lynch (1981) also defines identity as ‘the extent to which a person can recognize or recall a place as being distinct from other places’.

When human beings dwell, they are simultaneously located in space and exposed to a certain environmental character. In this context, two psychological functions involved: orientation” and “identification” (Norberg-Schulz, 1963). The problem of orientation has been given a considerable attention in recent theoretical literature on urban design. In this context, Lynch’s conceptualisation of man’s orientation with different elements of the city (defined as ‘path’, ‘districts’, ‘landmarks’, ‘edges’ and ‘nodes’) makes the basis for image-making. Here Lynch (1960) implies that an individual’s knowledge of a city is the extent to which ‘the extent to which a person can recognize or recall a place as being distinct from other places’. Although he limits himself to discuss the spatial function of these elements and thus leaving us with a fragmentary understanding of ‘place’, the work of Lynch constitutes an essential contribution to the theory of place. Place identification that is explained with the feeling that the place encourages users to express themselves and make them become involved in its affairs has been a prime characteristic of human beings since earliest cultures (Norberg-Schulz, 2007).
The quest for one’s identification with a specific environment and its analysis through the notion of identity are part of a long tradition of research. The need for place identity was first highlighted by Relph (1976, 147) as follows: “A deep human need exists for associations with significant places. If we choose to ignore that need, and follow the forces of placelessness to continue unchallenged, then the future can only hold an environment in which places simply do not matter. If, on the other hand, we choose to respond to that need and transcend placelessness, then the potential exists for the development of an environment in which places are for man, reflecting and enhancing the variety of human experience.” The topic of specialization of identity was developed further by some other authors since 1970s (Proshansky et al, 1983; Sarbin, 1983; Feldman, 1990). They have generally defined the concept of place identity as a substructure of self identity which comprises cognitions about the physical world in which individuals live. However, the literature cited above, like many studies in the field of urban design, have been restricted to form perspective, and neglected to consider the social dimension of environment. Place identification, in fact, is supported not only by the physical dimensions of the place but also social environment associated with it (Lalli, 1992; Pol, 2002; and Kyle et al 2005; Twigger-Ross and Uzzell, 1996; Choi, 2011; Sepe and Pitt, 2014). Based on these discussions, this paper aims to determine the measures of identity in an urban setting, and analyses the inhabitants’ identification with the city in a holistic research framework covering the multi-dimensional aspects of urban identity.

**Exploring the Concept of Urban Identity**

At a time when many places are beginning to look alike, effective urban design policies and strategies have the potential to reinforce local character and create places with identity. Therefore, a thorough analysis of the concept of identity is needed and an understanding of the ways through which it can be achieved without reducing the concept to an aesthetic dressing possesses a great importance.

In relation with experience of a city, place-identity leads to ‘urban identity’. Urban identity is thought to be formed not only through identifiable and memorable formal attributes, but through the meaning attached by the users of the city, concerning all elements of the built, natural and social environment. Therefore, there is a need for a holistic approach integrating objective measures achieved through pre-analysis of the urban environment, and subjective measures achieved through user surveys.

Discovering and reinforcing a city’s own identity can bring many advantages. One important advantage of having a reputable urban identity perceived by the users is at the place identification level. As Twigger-Ross and Uzzell (1996, 218) point out, place can be used to maintain positive self-esteem, this is closely associated with distinctiveness. The perception of the visual forms, which constitutes the physical environmental context, strongly affects how we make use of the city, and relates to the following qualities: the form, proportions and style of the buildings and their relationship with other buildings and urban spaces (morphology), their colour, materials and texture, landmarks, vistas, meeting places, street furniture, signs and ground surface. However, the two organizing elements of the city, the ‘district’ and ‘the public domain’, have the most significant impact on the urban identity as (Oktay 2002). Accordingly, it is assumed that if a city has some identifiable districts and well-defined public spaces, it can be conceived as a city with strong identity even if there are weaknesses in other aspects of the urban environment. There are many cities which are identified with their well-known squares, boulevards, streets, (i.e. Venice and Piazza san Marco, Paris and Boulevard Champs Elysee, the Ramblas and Barcelona, Siena and Piazza del Campo) and characteristic residential districts (i.e. the traditional Turkish/Ottoman city and narrow streets defined by courtyard walls, London and white terrace houses, Amsterdam and canal houses).
Since identity is related to the ‘character’ of an area, it is important to make a distinction between character and appearance; because, character has more than a purely visual or spatial dimension, and cannot be instantly achieved following the implementation of a new urban design scheme. As Manley and Guise highlighted (1998), a place can only gain real character with the passage of time. In Rossi’s words, “the city itself is the collective memory of its people, and like memory it is associated with objects and places. The city is the locus of the collective memory. This relationship between the locus and the citizenry then becomes the city’s predominant image, both of architecture and of landscape, and as certain artifacts become part of its memory, new ones emerge. In this entirely positive sense great ideas flow through the history of the city and give shape to it”.

In the context of natural environment, climatic, topographical, and landscape conditions are the major elements reflected on urban identity. Although every city has opportunities and constraints to develop its natural settings to give a unique sense of identity to the place, some cities are luckier to have a special geography. For instance, Istanbul, with its Bosphorus, ‘Golden Horn’ (the bay of Istanbul which separates the old and new parts of European Istanbul) and ‘seven hills’, is blessed with a unique geography. On the other hand, climate, as an intangible parameter of a place that is usually neglected, plays an important role in everyday life. As Knez (2005) highlights, it has an impact on individual, social and economic, and criminal behaviour and on meanings we attribute to places, as it is nested in places. Hence, it does not only constitute objectively a place, but also subjectively influences the way we experience and remember a place. Landscape, on the other hand, has an important role in creating the urban identity. A locally characteristic and identifiable landscape (both natural and artificial landscape) could be highly effective on urban identity. In this context, Hough (1990) suggests “the making of memorable places involves principles of evolving natural process and change over time”. There is culture in nature, and the image of nature is a product of society, of culture. As highlighted by Berglund (1998, 30), “old trees, old houses, and old places – urban places as well as parks – are all symbols of survival. They remind us of those who lived before and those who will live after us…”

The notion of urban identity is also bound up in the social environment, including psychological and cultural dimensions. Since the city is for people and their communication, it should then be seen as a framework for collective identity, and be readable and decipherable through the symbols relevant to local lifestyles and through meanings as documentation of history. The social environment of an individual is the culture that he or she was educated and/or lives in, and the people and institutions with whom the person interacts. Language, religion, ethnicity, family structure, residence type, food customs, communication patterns, privacy, density, territoriality, institutions, the way people display themselves through the clothes they wear and their activities, education level, etc., in this context, are the components. As Butina-Watson and Bentley highlight (2007, 4), “what matters in the construction of people’s identities is not the hardware of buildings, streets and green spaces in themselves, so much as what these mean to people. This depends on what the events and artifacts are seen as representing”. In this vein, Lang and Moleski (2010) state: “a sense of place depends on the qualities of the behaviour settings that exist in a locale, and the way the milieu is constructed in response to local conditions and traditions”. Here, one should be aware of the fact that the urban experience is the collective experience of places and space, and the city only signifies as we walk through it, along its paths and thoroughfares. The daily life patterns of local people in Havana, Cuba, in that sense, is a highly exemplary case in point as the identity of the city owes much to its unique social setting (people’s joyful manners and dancing in the courtyards and streets). From these, there appears the need for increasing the walkability of the city, in order to enable people to perceive and recognise the value and peculiarities of a place as a fundamental component in urban identity.
THE RESEARCH CONTEXT

Survey area: The city of Girne (Kyrenia), North Cyprus

The research presented here was carried out in the city of Girne (Kyrenia) in the spring of 2008. Girne, with a population of 69,163 (TRNC-SPO Population Census, 2011), experienced a rapid growth after 1974 as a result of the relocation of people from the south and its role as a port of trade with Turkey. Since it was the closest port to Turkey, trade activities have increased greatly and the city has become a commercial centre as well.

Girne is located on the northern coast of the island of Cyprus, where the urban life dates back to Hellenistic periods to 58 B.C. The history of Girne has seen various periods under the rule of various civilizations including Romans, Byzantines, Lusignans, Venetians, Ottomans, British, Greeks and Turks. The city is built around the horseshoe-shaped antique harbour, and surrounded by beautiful scenery at the foot of the northern range of mountains (the Beşparmak Range), which steeply slope towards the sea as a vast land for olive trees (Figures 1-5).

Figure 1. The view of the city of Girne and Besparrmack Range in the older times (Source: Girne City Archive)

Figure 2. The air view of the city of Girne (Source: D. Oktay archive)
In Girne, despite the need for tourism, retail, leisure, and residential developments, new constructions represented minimal urban development while rehabilitation and renovation work has proliferated in a period of two decades before 2002, owing to the uncertainty of the political state. However, the city has faced a serious problem of 'urban sprawl' in the last 6-7 years, owing to the now ill-fated UN Peace Plan of 2002 commonly known as the 'Annan Plan'. The said plan had generated an atmosphere of genuine confidence in the estate market that resulted in the surge in construction activities called the ‘construction boom’ in the whole of the island. What followed from these events in the absence of a working master plan was a scattered urban pattern to provide ‘homes’ or ‘second homes’ for the speculators and the expatriate Europeans (Englishmen and Germans in particular) who prefer the mild Girne winter to the cold and wet winter of their countries, and the loss of invaluable natural environment (olive orchards and other plants) on the hills surrounding the city. Besides, the population has significantly increased.
Pre-analysis
The observations reveal that Girne’s geographical position on the Mediterranean coast is a strong element in making the character of the city. The sea provides a natural ‘edge’ to the city although in some areas it is broken through by hotel developments. The city is also blessed with the backdrop of the Besparmak Mountains Range. The old harbour with a unique architectural heritage, once only used for lighters and long shore boats in the older times, is currently the most popular area for tourists and the local people to dine and spend time, and could be considered a ‘node’ in Lynch’s terms (Lynch 1960, 47) although it doesn’t link with the vehicular traffic. The seventeenth century Venetian castle dominating the harbour is the most important reference point or ‘landmark’ in Lynch’s terms (Oktay, 1998/2006).

The traditional urban pattern of the two old quarters (Limanarkasi, the neighbourhood behind the harbour with its contained outdoor spaces, Mediterranean style white-painted stone buildings with inner courtyards, fruit and citrus trees in the courtyards, flat roofs, plain cornices and small balconies, and Turk Mahallesi / Turkish Quarter with its narrow streets and cumba (bay-window) houses, developed in the Ottoman period) had unique architectural and natural characteristics and strong community ties in the past. In Limanarkasi district in particular, the street itself was the communal meeting place that extended into the house at ground level. Today, despite the functional transformations, social gathering among the neighbours in the street is still popular as observed in certain parts, even if the houses have private courtyards at the back. However, in some places where the vehicular and pedestrian traffic flow is dense, they sit close to the entrance inside and keep their door open to watch outside. The old buildings enclosing the harbour, originally the carob depots in the past during a period of trading with Arab countries are the other unique features in the town. However, today these two historic quarters, or ‘districts’ in Lynch’s terms, have a tendency to lose their authentic urban character due to the increasing number of shops, cafés and restaurants that favour international styles and images rather than reflecting the Cypriot image.

On the other hand, the newer quarters extending the outskirts of the city in the last 10 years have no special character at all. These housing areas, which spoil the precious land on the Kyrenia Range foothills covered by olive trees are contrary to the local traditional pattern; the
residential buildings in these areas are modern concrete-frame slabs and isolated on their individual plots (Figures 6-7).

Figure 6. New apartment buildings in Girne (Source: D. Oktay archive)

Figure 7. New villa developments on the outskirts of the Bespamak Range (Source: D. Oktay archive)

The positive qualities of a definite centre cannot be observed either in the major square of the expanded city, the Municipality square, or in the other square by the sea (Monument Square) where the ceremonies are being held. Both squares lack three-dimensional qualities; the major square which has a potential of being a ‘node’ in Lynch’s vocabulary, serves as a traffic island
only, and the other square, despite its potential of being a lively gateway to the harbour area, reveals a very artificial image and cannot attract people. The promenade along the coast here seems to be the most popular place at weekends, and has great potential of being a strong element of urban identity, that could be considered a ‘path’ in Lynch’s terms. Owing to the urban sprawl, the vehicular traffic has significantly increased in the last ten years, and the walkability of the city has therefore been limited. The streets in the newly developed areas cannot be considered strong elements of townscape as they lack many social-spatial qualities found in the traditional texture and do not have distinctive features. The major commercial streams on the other hand, seem to be the most well-known ‘paths’ although their physical and spatial qualities lack.

It is very unfortunate that locally characteristic green elements are not valued in the new designs and developments, and this in turn, causes very artificial images that dominate the mountainous areas.

User survey
The survey research consisted of three phases, based on a multi-methods technique:

- a questionnaire survey design phase - to determine the data needs and approaches that would be used to gather data and to design and test data-collection instruments;
- a data collection phase - to administer the questionnaires, complete the site observations, and measure environmental conditions;
- a documentation and data analysis - to report main findings.

Using a random sampling procedure, the sample consists of 310 residents (permanent residents of 18 years of age and over). Participants live in varied neighbourhoods, that is, town centre through outskirts, covering a heterogeneous socio-economic characteristic of the population. 250 interviews were successfully accomplished in an 81 percent response rate. The face-to-face interviews were carried out in spring 2008 by the trained interviewees of a professional survey company (KADEM, Nicosia) in close contact with the researchers, the authors of this paper. Filling out the survey was done individually at the participants’ homes, and the average length of an interview was about 30 minutes. The interview process was monitored by fieldwork supervisors, and the data collected were validated through independent checking.

The survey form consisted of two sections. The first section included questions that tap at people’s perception of urban identity, their rating of importance among various determinants of identity, and their perception of change regarding the city’s identity in time. In the second section, participants’ socio-demographic characteristics were identified by asking questions regarding gender, age, education, occupation, citizenship, status of the dwelling, monthly income, and length of residence in Girne.

RESULTS AND ANALYSIS

Characteristics of the sample
As presented in Table 1, of the 250 respondents, 53 percent were male, and 47 percent were female. Ages ranged from 18 to 85 with a mean of 43. 37 percent of the respondents have been living in Girne for 34 years or more, 33 percent have been living for 19-33 years, 17 percent have been living for 6-18 years, and smaller percentages have been living for less than 5 years. 82 percent of the respondents were the citizens of the Turkish Republic of Northern Cyprus, 12 percent were the citizens of Turkey, 5 percent hold the citizenship of both countries (TRNC and Turkey), and a very small portion were the settlers from other countries. 74 percent of the respondents were either high school graduates or university graduates. The respondents
included a variety of professional status including businessmen, students, homemakers, retired people, workers, shop owners, teachers, officials, etc.

Perceived elements of urban identity

**Major elements perceived as the most significant in making the urban identity**

In response to the question “please identify the significance of each following element in terms of contributing to the image of Girne”, 73 percent of the respondents identified the historical places and landmarks (reference points), 61 percent identified the natural environment and, and 57 percent identified the social environment as the most significant elements. The evaluations were made using a five-point response scale that ran from ‘very weak aspect’ (1) to ‘partially significant aspect’ (2), and to ‘very significant aspect’ (3). Overall, the respondents expressed mixed feelings regarding the most important elements of urban identity, on the basis of their many different ways in which their relationship with the local area impacted. The findings reveal that historical places and landmarks play the most important role in the identity of Girne. Natural elements are also seen important although the percentage of respondents (61 percent) who agree with this is lower than those emphasizing the role of historic elements (73 percent). However, there is a weakness in terms of perception of traditional urban pattern as a characteristic setting in making the image of Girne, and recreational areas cannot make a significant contribution to the image of the city (Table 2).

Table 1. Characteristics of the sample (Source: Authors)

<table>
<thead>
<tr>
<th>Socio-demographic characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>68</td>
<td>27.3</td>
</tr>
<tr>
<td>25-39</td>
<td>83</td>
<td>33.2</td>
</tr>
<tr>
<td>30-55</td>
<td>49</td>
<td>19.6</td>
</tr>
<tr>
<td>56-....</td>
<td>50</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>133</td>
<td>53.0</td>
</tr>
<tr>
<td>Female</td>
<td>117</td>
<td>47.0</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRNC</td>
<td>204</td>
<td>81.6</td>
</tr>
<tr>
<td>Turkey</td>
<td>29</td>
<td>11.6</td>
</tr>
<tr>
<td>TRNC+Turkey</td>
<td>12</td>
<td>4.8</td>
</tr>
<tr>
<td>Other (Bulgaria, Germany, Moldavia)</td>
<td>12</td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>32</td>
<td>13.0</td>
</tr>
<tr>
<td>Secondary</td>
<td>32</td>
<td>13.0</td>
</tr>
<tr>
<td>High school</td>
<td>119</td>
<td>47.6</td>
</tr>
<tr>
<td>University/Postgraduate</td>
<td>66</td>
<td>26.4</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Length of residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 34 years</td>
<td>92</td>
<td>36.8</td>
</tr>
<tr>
<td>19-33 years</td>
<td>82</td>
<td>32.8</td>
</tr>
</tbody>
</table>
Table 2. Major elements perceived as the most significant in making the image of Girne (Source: Authors)

<table>
<thead>
<tr>
<th>Major elements</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical places / reference points</td>
<td>182</td>
<td>72.8</td>
<td>2.82</td>
<td>1.048</td>
</tr>
<tr>
<td>Natural environment</td>
<td>154</td>
<td>61.0</td>
<td>2.63</td>
<td>.936</td>
</tr>
<tr>
<td>Socio-cultural environment</td>
<td>143</td>
<td>57.2</td>
<td>2.58</td>
<td>1.066</td>
</tr>
<tr>
<td>Economic potential</td>
<td>133</td>
<td>53.2</td>
<td>2.55</td>
<td>1.158</td>
</tr>
<tr>
<td>Built environment</td>
<td>119</td>
<td>47.6</td>
<td>2.45</td>
<td>1.195</td>
</tr>
<tr>
<td>Recreational areas</td>
<td>68</td>
<td>27.2</td>
<td>2.16</td>
<td>1.544</td>
</tr>
</tbody>
</table>

**Most influential elements of the natural, built and social environment**

In order to identify the most influential elements of the natural, built and socio-economic environment, respondents were asked to rate the influence of a number of qualities the city possesses. Using a three-point response scale that ran from ‘not influential’ (1) to ‘somewhat influential’ (2), and to ‘very influential’ (3), the most influential dimensions were identified.

As seen in Table 3, in each set of characteristics, several elements were rated as the most influential on the urban identity. The city’s unique location along the coast and on the slopes of the Besparmak Range achieved a high rating by the majority (82 percent) of the respondents, that is in agreement with the pre-analysis. The locally characteristic vegetation, such as olive trees, begonvilles, carob trees, etc., seems to make some contribution to the urban identity as well (52 percent).

The built elements which achieved the highest rating were St. Hillarion Castle (82 percent) and Bellapais Monastry (80 percent), the historic landmarks outside the city. Girne’s antique harbour and the Venetian Castle, the two unique places, which were assumed to be the most identifiable features, achieved a moderate rating only. Traditional urban quarter behind the harbour was not mentioned favourably as a major element of identity.

Amongst a number of elements making the socio-cultural context, Girne’s image as the center for tourism achieved the highest rating (81 percent) by the respondents. In addition, the role of Girne American University on the urban identity was mentioned by 64 percent of the respondents. The traditional daily life patterns such as people’s sitting and socializing in front of their houses or shops have not been highlighted at all.

**The best and the worst features of Girne as perceived**

In addition to the questions directly referring to urban identity, participants were asked to choose the best and worst features of Girne among a number of positive and negative aspects. Table 4 shows the most outstanding aspects identified by at least one-fifth of the respondents.
These findings support the hypothesis that the special geography of the town, with its integration with nature, proximity to the sea and the view to the mountains despite some interventions, has a very positive role on the perception of the city (valued by 85 percent). Presence of historical environment and historic reference points were also considered ‘best features’ by more than half of the respondents as well (54 percent). However, the other important feature of the town, its unique traditional urban texture was not favourably mentioned by the respondents. When they were asked to choose the worst features of the city, building density was referred to by the majority of the respondents, followed by the expensive living and intensive traffic.

Table 3. Perceived elements of identity at levels of natural, built and social environment
(Source: Authors)

<table>
<thead>
<tr>
<th>Perceived elements of urban identity</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>Standard.dev.</th>
<th>Perception</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural Environment (9 A-F)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location along the coast and on the mountains</td>
<td>204</td>
<td>81.6</td>
<td>2.86</td>
<td>.694</td>
<td>High</td>
</tr>
<tr>
<td>Temperate Mediterranean climate</td>
<td>178</td>
<td>71.2</td>
<td>2.70</td>
<td>.685</td>
<td>High</td>
</tr>
<tr>
<td>Olive trees, begonvilles, carob trees, and etc.</td>
<td>130</td>
<td>52.0</td>
<td>2.49</td>
<td>.995</td>
<td>Moderate</td>
</tr>
<tr>
<td>Panoramic view of the city from mountains</td>
<td>176</td>
<td>70.4</td>
<td>2.72</td>
<td>.794</td>
<td>High</td>
</tr>
<tr>
<td>Fresh mountain air due to its location</td>
<td>133</td>
<td>53.2</td>
<td>2.66</td>
<td>.723</td>
<td>Moderate</td>
</tr>
<tr>
<td>Beaches in and around the city</td>
<td>178</td>
<td>71.2</td>
<td>2.69</td>
<td>.699</td>
<td>High</td>
</tr>
<tr>
<td><strong>Built Environment (10 A-H)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antique harbour and the Venetian Castle</td>
<td>204</td>
<td>71.2</td>
<td>2.83</td>
<td>.577</td>
<td>High</td>
</tr>
<tr>
<td>Traditional urban pattern/places/buildings</td>
<td>154</td>
<td>61.6</td>
<td>2.61</td>
<td>.840</td>
<td>High</td>
</tr>
<tr>
<td>Winding streets with surprising vistas</td>
<td>123</td>
<td>49.2</td>
<td>2.39</td>
<td>.820</td>
<td>Low</td>
</tr>
<tr>
<td>Old courtyard houses creating a continuous wall</td>
<td>129</td>
<td>51.6</td>
<td>2.46</td>
<td>1.018</td>
<td>Moderate</td>
</tr>
<tr>
<td>Bellapais Monastery and village with unique qualities</td>
<td>199</td>
<td>79.6</td>
<td>2.86</td>
<td>.810</td>
<td>High</td>
</tr>
<tr>
<td>View to St. Hilarion Castle</td>
<td>206</td>
<td>82.4</td>
<td>2.82</td>
<td>.609</td>
<td>High</td>
</tr>
<tr>
<td>Housing areas spread out on the mountains</td>
<td>86</td>
<td>34.4</td>
<td>2.09</td>
<td>.905</td>
<td>Low</td>
</tr>
<tr>
<td>Holiday villages, hotels, residential complexes, etc.</td>
<td>156</td>
<td>62.4</td>
<td>2.60</td>
<td>.865</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Social Environment (11 A-G)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourism city as a recreational/entertainment hub</td>
<td>203</td>
<td>81.2</td>
<td>2.83</td>
<td>.742</td>
<td>High</td>
</tr>
<tr>
<td>Cultural and arts activities</td>
<td>118</td>
<td>47.2</td>
<td>2.36</td>
<td>.821</td>
<td>Low</td>
</tr>
<tr>
<td>Narrow streets and lining shops in the old quarter</td>
<td>118</td>
<td>47.2</td>
<td>2.49</td>
<td>1.15</td>
<td>Low</td>
</tr>
<tr>
<td>Sitting in front of the buildings/houses</td>
<td>69</td>
<td>27.6</td>
<td>2.01</td>
<td>.996</td>
<td>Low</td>
</tr>
<tr>
<td>Presence of the Girne American University</td>
<td>159</td>
<td>63.6</td>
<td>2.55</td>
<td>.936</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cosmopolitan structure embracing various cultures</td>
<td>129</td>
<td>51.6</td>
<td>2.54</td>
<td>1.155</td>
<td>Moderate</td>
</tr>
<tr>
<td>Accommodation of people from Limassol</td>
<td>96</td>
<td>38.4</td>
<td>2.33</td>
<td>1.297</td>
<td>Low</td>
</tr>
</tbody>
</table>

Level of perception:
% 70-100: High; % 50-69: Moderate; % 25-49: Low.

**Perceived changes in urban identity**

It is a fact that, in response to social, economic and political forces, cities are always changing; a city has never been static; it is evolving and in the process of evolving, can also destroy and replace its parts. Therefore, urban identity has to be considered in a time-based perspective. In this regard, respondents were first asked to choose one of the following statements: “The city loses its identity”; “Identity does not change”; “Identity is being
strengthened”; “A new identity is being established”; and “Chaos is being established instead of identity”

According to the findings, almost half of the respondents (46 percent) believe that the city loses its identity, one-third of the respondents (21 percent) think it does not change, 15 percent think new identity is being established, 10 percent think it is getting stronger, and 8 percent believes that chaos is being established instead of identity (Table 5).

Table 4. The best and the worst features of Girne as perceived (Source: Authors)

<table>
<thead>
<tr>
<th>Best features of Kyrenia</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration with nature, proximity to the sea and the view to the mountains</td>
<td>85</td>
</tr>
<tr>
<td>Presence of historical environment and historic reference points</td>
<td>54</td>
</tr>
<tr>
<td>Social activities and entertainment</td>
<td>37</td>
</tr>
<tr>
<td>Liveliness during the day and night</td>
<td>27</td>
</tr>
<tr>
<td>Unique traditional urban texture</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Worst features of Kyrenia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Building density</td>
<td>67</td>
</tr>
<tr>
<td>Expensive living</td>
<td>41</td>
</tr>
<tr>
<td>Intensive traffic</td>
<td>37</td>
</tr>
<tr>
<td>Noise</td>
<td>25</td>
</tr>
<tr>
<td>Limited job opportunities</td>
<td>25</td>
</tr>
<tr>
<td>Lack of maintenance of streets and open spaces</td>
<td>25</td>
</tr>
<tr>
<td>Too many immigrants from other countries</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 5. The perceived identity and change in Girne (Source: Authors)

<table>
<thead>
<tr>
<th>Perception of urban identity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The city loses its identity</td>
<td>46,0</td>
</tr>
<tr>
<td>Identity does not change</td>
<td>20,8</td>
</tr>
<tr>
<td>Identity is being strengthened</td>
<td>9,6</td>
</tr>
<tr>
<td>A new identity is being established</td>
<td>15,2</td>
</tr>
<tr>
<td>Chaos is being established instead of identity</td>
<td>8,4</td>
</tr>
<tr>
<td>Total</td>
<td>100,0</td>
</tr>
</tbody>
</table>

In addition, the mode of change as perceived by respondents was measured by the following single question: “How have your thoughts about Girne changed?” Findings reveal that the perception of Girne’s urban identity has changed negatively for the 40 percent of the respondents, while 31 percent has been neutral, and 28 percent positive (Table 6).

Table 6. The mode of change as perceived by respondents (Source: Authors)

<table>
<thead>
<tr>
<th>How has your perception of identity changed in time?</th>
<th>&gt;34 year</th>
<th>19-33 year</th>
<th>6-18 y</th>
<th>1-5 y</th>
<th>&lt;1 year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changed positively</td>
<td>25,0</td>
<td>22,0</td>
<td>52,4</td>
<td>40,0</td>
<td>10,5</td>
<td>28,4</td>
</tr>
<tr>
<td>Neither positively nor negatively</td>
<td>30,4</td>
<td>34,1</td>
<td>23,8</td>
<td>26,7</td>
<td>42,1</td>
<td>31,2</td>
</tr>
<tr>
<td>Changed negatively</td>
<td>44,6</td>
<td>43,9</td>
<td>23,8</td>
<td>33,3</td>
<td>47,4</td>
<td>40,4</td>
</tr>
<tr>
<td>Total</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
</tr>
</tbody>
</table>
DISCUSSION AND CONCLUSION

This study aimed to identify the measures of identity in Girne (Kyrenia), an urban setting in the island of Cyprus which has unique built, natural and social environmental qualities and a dynamic urban growth, and to analyse the inhabitants’ identification with the city. Within this context, a holistic approach was adopted and a questionnaire/attitude survey was carried out following a preliminary analysis in the city.

The survey findings revealed that the historical landmarks (reference points) are so powerful in constructing the urban identity even if they are outside or at the edge of the city. The traditional urban tissue was also found significant in constructing the urban identity although not strongly mentioned and not appreciated as one of the best features of the city. However, the new villa-type housing developments spread out on the slopes of the mountains were not rated favourably in terms of their influence on the urban identity. This could be explained by the lack of quality of their architecture and context in terms of local appropriateness and character, as they were also mentioned as the worst features of the town.

The findings indicated that the geography and natural environment of the city have a significant impact on making the urban image as well, that is in agreement with Oktay (1998) and Bornberg (2008).

In the context of social environment, Girne’s image as the center for tourism achieved the highest rating (81 percent) and the role of Girne American University on the urban identity was mentioned by the two-thirds of the respondents (64 percent). The traditional life patterns that are still visible in the old quarters have not been highlighted at all, probably due to the lack of a proper activity pattern in these areas and the lack of integration with other districts of the city. The findings also indicated that the university has some significant impact on the urban life.

Further, as the findings revealed that the perception of urban identity changes in time, there appears an opportunity to regain and/or enhance identity through various strategies. In this context, it can be stated that appropriate urban design solutions depend so much on the specific context of a particular area, including all environmental dimensions. The following can be suggested to create and/or enhance the identity of Girne and all other small cities with unique built, natural and social environmental qualities and a dynamic urban growth:

- The urban sprawl should be taken very seriously by all authorities considering its negative effects on the urban image and identity.
- The walkability of the town should be increased through adopting traffic calming schemes, improving the physical conditions of the pedestrian paths and sidewalks, and promoting diversity of public uses along the streets in the central area.
- Designing with nature, integrating with nature and using nature to the advantage of its people should be key themes in future urban/architectural developments.
- A heritage awareness strategy should be planned by the local authority in order to increase the attraction and use of the older core of the city and its traditional buildings by all types of users at all times.
- Presence of traditional social-spatial context in the urban scenery should be sustained through the adaptive re-use provided that local people still reside in some of the buildings in the older core.
- The landmarks that help identify the city should be highly valued and protected; in newly developed urban areas, new symbols, landmarks or focal points should be introduced into the urban townscape.
- Although we do not have to recall again the romantic plazas of Renaissance Italy as the model of good city design, we should still consider the street as a community room, and design or redesign them as ‘places to go and spend time’ with people’s physical, social and aesthetic needs and expectations are in mind.
All these recommendations bring about the need for preparation of an area character appraisal and management plan for the particular city, provided that the future policies are protecting the urban identity.

This research has focused on the urban environment. A number of limitations with the present approach is recognised by the authors as the discussions and evaluations refer to the city, a very complex organism, as a whole, and it is therefore considered tolerable that the relationship between urban identity and some variables (i.e. cultural background, educational level, tenure status, and so forth) was not analysed in the scope of the paper. Although the authors are confident that the survey materials used in this study could be used in other contexts, and urban identity may be measured in other cities of North Cyprus in order to obtain more comprehensive evidence, further work could examine the salience of other important environment and identity settings, such as residential environment and identity settings, and focus on such potential predictors.

REFERENCES


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DEVELOPING METHODOLOGY FOR ADAPTIVE RE-USE: CASE STUDY OF HERITAGE BUILDINGS IN PALESTINE

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Abstract
Various heritage buildings around the world are currently undergoing a process of reuse. However, reuse selection of such properties is difficult due to the differing opinions of those involved. Sustainable building conservation can be hastened by an appropriate reuse selection evaluation procedure. The objective of this study is to develop an inclusive methodology based on varying pertinent issues for the optimum adaptive reuse selection of heritage buildings. The reuse selection criteria are identified through the Delphi Method (DM) with fuzzy logic theory, which is used in the Analytic Network Process (ANP) model. Khan Al-Wakalah is applied as a case study to demonstrate the implementation of ANP in Palestine. The findings show that there is a marked link between the criteria. These factors have great importance and should be further considered in the evaluation and selection processes. These criteria allows those at the decision making level to familiarise themselves with the complex relationships between the different traits of the problems in reuse selection, thus making it easier for the decisions to be accepted by all concerned.

Keywords: Adaptive reuse methodology; Heritage buildings; Analytic network process; Delphi method.

INTRODUCTION
It had been proposed that buildings of historic value be characterised as world cultural heritage properties due to their exceptional universal values, either historically or with respect to art and science. The operational guidelines that put this forward in 2008 for the implementation of the World Heritage Convention (Wang & Zeng, 2010) specifically included in the usage of these premises for numerous purposes sensitive to the sustainability of ecology and culture. In the tourism industry, heritage and culture were amongst the most important and economically viable elements (Bedate, Herrero, & Sanz, 2004). Presently, many such buildings are valued by governments as they are attractive, commercially beneficial tourism assets (Pedersen, 2002). Nevertheless, in the reuse selection of buildings there persist a number of economic, developmental and cultural preservation differences between the professionals and parties in dissimilar situations (Teo & Huang, 1995; Tiesdell, 1995).

On either side of the divide in historic buildings reuse selection; the developers oppose the professionals (including architects, architectural historians and local government personnel). For the developers, time is money. On the other hand, the professionals have the job of closely monitoring and judging the work standards in every case to ensure the protection of the historic fabric (Murtagh, 2006). The process of selecting buildings for reuse needs to consider a number of crucial factors. Most of these factors are inter-linked and have to be taken into account very seriously to result in a successful project in all respects.

In the past two decades, a number of methods and techniques have been developed as solutions. A particular method of solving problems of decision-making in historic building reuse
selection is the AHP, the Analytic Hierarchy Process (Saaty, 1980). Although in common use throughout the world, the AHP has the drawback of utilising mainly independent criteria for decision-making. Another technique, the ANP, the Analytic Network Process (Saaty, 1996) is more realistic in that it is based on interdependent criteria data; hence evaluations are based on real issues, solving problems on the ground. It has been noted that the utilisation of ANP has been increasing steadily over the years (Cheng & Li, 2006; Kim et al., 2010). Another notable procedure, the Delphi method, addresses the problem of interviewing experts in one group at a particular time, by using nameless questionnaires. In this way it is easier to obtain experts’ professional opinions in identifying possible criteria of historic building reuse selection without the effect of individuality. The Fuzzy Delphi method introduced by Ishikawa in 1993 (Ishikawa et al., 1993) further assembled experts’ opinions into fuzzy quantities, more reasonable with fuzzy theory which saved a lot of time.

LITERATURE REVIEW

To assist professional teams to produce a list of criteria for the reuse selection of historic buildings and their interdependence, the literature review concentrates on the related problems in the current situation.

In 1979, Farrell suggested some basic criteria for reuse selection, after completing three such projects in London (Markus, 1979). The first was to determine the reason why it was built in such a manner, the construction system of the building and its division or compartmentalisation. Next was to gauge and determine the existing condition of the building fabric and thus estimate whether it justifies the project cost while abiding with the proposed use. Equally important was the need to be certain about the project expenditure, the actual amount necessary for profitable reuse covering a worthwhile, beneficial period of time, hence the total financial implications. It was noted that the reuse process would greatly depend on human labour instead of on material and energy, which has a marked bearing on the financial factor. Then an assessment is needed regarding the characteristics of the building that can be used to cater to new needs. In reuse selection, the building always received more attention compared to the location, and it was analysed in detail regarding its attributes and problems. In 1988, Luther stated that in the private sector, great importance was placed on the agreement between the architect and the client (Austin, Woodcock, Steward, & Forrester, 1988); public interest took a back seat, especially in the initial stages including the development of design concepts. Observations on environmental issues and values were drafted in master plans, policies and by-laws, in the form of the zoning of land use, historic districts, and neighbourhood committees while residents’ views and opinions were taken into account. The whole scheme would often be placed at risk as designers were usually made aware of these vital elements only when seeking approval from local governments.

Murtagh proposed in 2006 some pointers for the successful, economically viable, historically preserving reuse of such buildings (Murtagh, 2006). A detailed study of the economic possibilities and the project’s location has to be carried out and answers determined at the very beginning. There are some very important factors to be considered before deciding on the architectural and historical evaluation. It has to be confirmed whether the reuse is really necessary; what the area’s current social and demographic factors are; whether they are conducive to the work; and the environmental issues should be noted. Services like transportation need to be already in place. The nature of the present development in the locality should be determined. The competition, the local building by-laws and the zoning types influence the type of reuse. Regarding physical analysis of the buildings, it is pertinent to examine the structural stability and the condition of the existing mechanical systems. It is also necessary to consider whether the building fulfils the requirements of the National Register’s
criteria, what is left of the historic fabric, the original building material, the workmanship that ultimately provides character and integrity to the building, and the percentage to be preserved.

As to the location, its environment and existing condition, all have their own shortcomings and advantages which affect the reuse project tremendously, and it is necessary to carry out a detailed study and inventory of these issues (Austin et al., 1988). The Architectural Institute of Japan drew up a set of guidelines in 2007 for evaluating a historic building, adopting the method of preservation and usage in every reuse selection, based primarily on five basic elements and deciding factors, namely the history, the culture/ artistry, the technology, the environmental aesthetics, and the social context/norms (Japan, 2007). Also taken into consideration was the effect on society and the environment. Premises should have integrity, originality, efficient protection and a management system for its own well being, to be considered significant (Wang & Zeng, 2010). Other objectives of this set up were to encourage public sensitivity, participation, and support by way of the media as well as to improve communities’ participation in World Heritage Convention projects.

**METHODOLOGY**

The methodology of this study consists of five stages; establish a team of appropriate experts to determine the aims, anticipated outcomes and possible reuse options, then use the Fuzzy Delphi method to develop a Network Matrix. Using the AHP technique is the fourth step, ultimately employing ANP for the final decision (Figure 1, Left).

A team of twelve professionals including architects, architectural historians, developers, managers, contractors and public service professionals was set up through FDM. Their unanimous findings through questionnaires scrutinised uniformity and consistency. Problems of unclear direction and hesitations persist in questionnaires and answers (Sackman, 1974). The solution by the fuzzy set theory, to determine the criteria and interdependence of reuse, was through the participants’ estimates of negative, middling and positive values from which triangular fuzzy numbers (TFNs) were derived and the average inserted into a data bank (Ishikawa et al., 1993; Kaufmann, 1988). A TFN has been indicated as (l, m, u) which means respectively (lower value, modal value, upper value). These parameters represent a fuzzy phenomenon (Figure 1, Right). In the Fuzzy Delphi method, there are a number of advantages like the grouping of various experts incognito to prevent a situation where individuals impose their opinions and obtain unanimous decisions from the team’s systematic approach. (Cho & Lee, 2013)

The analytic network process involves an inclusive, indiscriminate resolution that considers all necessary criteria, with the AHP as the preliminary stage. In decision-making, the ANP is more generalised and accommodates the independence of factors at various levels; higher, lower or similar. It can thus be stated that in the reuse selection of historic buildings, it is vital to start with gathering and listing all related criteria including alternatives that are then shown according to their level of interdependence. The effect each criterion has on each other can then be deduced, facilitating the next step of identifying the best option by comparing alternatives with respect to cultural, social and economic perspectives. In these comparisons between options, questions on the degree of impact and the effects of the interdependent criteria have quantitative answers and reciprocals in a matrix scaled from 1 to 9 , as proposed by Saaty (1996), where 9 is absolutely more important, and 1 is equally important) (Saaty, 1980, 1996). Then these criteria and options can be listed according to that defined importance.
THE PROPOSED MODEL

The reuse selection principles were grouped into different perspectives; social, environmental, architectural, economic, and cultural. Problems arising in reuse selection of historic buildings had these principles existing in co-dependency. For instance, cultural significance and economic benefits were heightened by the preservation of the architectural merit of such buildings. However, cultural worth decreases if the reuse has no element of permanence and is not conducive (Khan, 2015). Figure 2 (Left) shows the links between the criteria as discussed by the team as a whole, not just an individual opinion. Figure 2 (Right) indicates a typical accepted grid for the experimental model and the application of the algorithm to obtain the degrees of importance.
Each of participants was asked to give his comparison; the input from each cell of the decision matrix and built geometric mean were taken to get the consolidated AHP input matrix (Table 1). The five principles or criteria were examined and compared in pairs, seeking out those that should be allocated more importance. After building the matrix, the normalisation becomes easy where the sum of every column in the matrix should be equal to 1, i.e. every component Nrc (r: number of row, c: number of column, m: number of evaluation criteria) of the matrix is computed as in Figure 3 (Left). Ultimately, the weight (Eigen Vector) T can be attained by taking the average of every row of the normalised items. (Figure 3, Right)

\[
\bar{N}_{rc} = \frac{N_{rc}}{\sum_{c=1}^{m} N_{c}}
\]

\[
T_{r} = \frac{\sum_{r=1}^{m} \bar{N}_{r}}{m}
\]

Figure 3. (Left) computing the matrix components (Source: (Wang & Zeng, 2010); (Right) Eigen Vector (Source: Cheng & Li, 2006).

Using the AHP technique, a set of data was arrived at, in a weight matrix T1 = (R1, R2, R3, R4, R5) = (0.109, 0.116, 0.422, 0.060, 0.292) and bypassing the interdependence factor among them (Table 1).

<table>
<thead>
<tr>
<th>Unnormalized</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>1</td>
<td>1</td>
<td>1/4</td>
<td>2</td>
<td>1/3</td>
</tr>
<tr>
<td>R2</td>
<td>1</td>
<td>1</td>
<td>1/3</td>
<td>2</td>
<td>1/3</td>
</tr>
<tr>
<td>R3</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>R4</td>
<td>1/2</td>
<td>1/2</td>
<td>1/6</td>
<td>1</td>
<td>1/5</td>
</tr>
<tr>
<td>R5</td>
<td>3</td>
<td>3</td>
<td>1/2</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Normalized</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
<th>Weights (Eigen Vector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>0.105</td>
<td>0.118</td>
<td>0.111</td>
<td>0.125</td>
<td>0.086</td>
<td>0.109</td>
</tr>
<tr>
<td>R2</td>
<td>0.105</td>
<td>0.118</td>
<td>0.148</td>
<td>0.125</td>
<td>0.086</td>
<td>0.116</td>
</tr>
<tr>
<td>R3</td>
<td>0.421</td>
<td>0.353</td>
<td>0.444</td>
<td>0.375</td>
<td>0.517</td>
<td>0.422</td>
</tr>
<tr>
<td>R4</td>
<td>0.053</td>
<td>0.059</td>
<td>0.074</td>
<td>0.063</td>
<td>0.052</td>
<td>0.060</td>
</tr>
<tr>
<td>R5</td>
<td>0.316</td>
<td>0.353</td>
<td>0.222</td>
<td>0.313</td>
<td>0.259</td>
<td>0.292</td>
</tr>
</tbody>
</table>

| Maximum Eigen Value | 5.045 |
| C.I.                | 0.011 |

Tables 2 & 3 show the effect and impact of the five criteria on each other in pairs in their linked roles. It was found that among others, the relative impact of the architectural principle on that of the environmental criterion was 0.057 in the weight matrix. On the other hand, 0.102 was the environmental aspect’s effect on that of architectural.
Table 2: Relative influence for every criterion (Source: Authors)

<table>
<thead>
<tr>
<th></th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
<th>Maximum Eigen Value</th>
<th>C.I.</th>
<th>Weights (Eigen Vector)</th>
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</thead>
<tbody>
<tr>
<td>Social Value</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(Criterion 1) (T31)</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>R1</td>
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<td>0.444</td>
<td>0.728</td>
<td>0.600</td>
<td></td>
<td>5.234</td>
<td>0.058</td>
</tr>
<tr>
<td>R2</td>
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<td>0.083</td>
<td>0.056</td>
<td>0.049</td>
<td>0.075</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
</tr>
<tr>
<td>R3</td>
<td>0.077</td>
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<td>0.056</td>
<td>0.029</td>
<td>0.025</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
</tr>
<tr>
<td>R4</td>
<td>0.124</td>
<td>0.250</td>
<td>0.278</td>
<td>0.146</td>
<td>0.225</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
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<tr>
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<td>0.083</td>
<td>0.167</td>
<td>0.049</td>
<td>0.075</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
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<td>Environmental Value</td>
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<td></td>
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<td>0.375</td>
<td>0.476</td>
<td>0.300</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
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<tr>
<td>R2</td>
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<td>0.382</td>
<td>0.313</td>
<td>0.381</td>
<td>0.300</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
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<tr>
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<td>0.076</td>
<td>0.063</td>
<td>0.032</td>
<td>0.050</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
</tr>
<tr>
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<td>0.096</td>
<td>0.188</td>
<td>0.095</td>
<td>0.300</td>
<td></td>
<td>5.280</td>
<td>0.070</td>
</tr>
<tr>
<td>R5</td>
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<td>0.064</td>
<td>0.063</td>
<td>0.016</td>
<td>0.050</td>
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<td>0.070</td>
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<td></td>
</tr>
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<td></td>
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<td>0.094</td>
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<td>5.777</td>
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<td>Economic Value</td>
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<tr>
<td>(Criterion 4) (T34)</td>
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<td></td>
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<tr>
<td>R1</td>
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<td></td>
<td>5.164</td>
<td>0.041</td>
</tr>
<tr>
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<td>0.073</td>
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<td></td>
<td>5.164</td>
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</tr>
<tr>
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<tr>
<td>R4</td>
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<td></td>
<td>5.164</td>
<td>0.041</td>
</tr>
<tr>
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<td>0.091</td>
<td>0.000</td>
<td>0.128</td>
<td>0.136</td>
<td></td>
<td>5.164</td>
<td>0.041</td>
</tr>
<tr>
<td>Cultural Value</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(Criterion 5) (T35)</td>
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<td></td>
<td></td>
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</tr>
<tr>
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<td>0.211</td>
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<td></td>
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<tr>
<td>R2</td>
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<td>0.111</td>
<td>0.286</td>
<td>0.093</td>
<td></td>
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</tr>
<tr>
<td>R3</td>
<td>0.480</td>
<td>0.316</td>
<td>0.333</td>
<td>0.286</td>
<td>0.279</td>
<td></td>
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<td>0.137</td>
</tr>
<tr>
<td>R4</td>
<td>0.080</td>
<td>0.053</td>
<td>0.167</td>
<td>0.143</td>
<td>0.279</td>
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<td>0.137</td>
</tr>
<tr>
<td>R5</td>
<td>0.320</td>
<td>0.316</td>
<td>0.333</td>
<td>0.143</td>
<td>0.279</td>
<td></td>
<td>5.548</td>
<td>0.137</td>
</tr>
</tbody>
</table>
The data collected from these three stages presented the interdependence priorities of the reuse selection criteria shown in the following.

**CASE STUDY (KHAN AL-WAKALAH)**

Palestine is located in a strategic location between Jordan, Syria, Lebanon, and Egypt; it is the land of heavenly messages, human civilization and monotheistic religions. More than 6000 archaeological settlements have been discovered in the West Bank and Gaza Strip (Ghadban, Hassan, Aboudi, & Khateeb, 2014). In the heart of the old city of Nablus at the souk’s western perimeter stands a building on Roman and Crusaders’ ruins. This is Khan Al-Wakalah, also known as Khan Al-Farukh after one of the governors of Nablus, Prince Farukh (Irving, 2011). Filled with commercial premises, warehouses, stables, and lodging quarters, it was a caravanserai on a much-used trade route between Damascus and Jerusalem, also benefitting from being on the pilgrims’ road to the holy cities of Mecca and Medina (Figure 4, Left) (IItma, 2011). Stone forms the main material of the façade of this building, constructed on rocky topography with Roman ruins and old Mamluki buildings below it to the east. Khan Al-Wakalah has Ottoman features, with an irregular polygonal inner courtyard and corridors on the upper floors. The western side has three floors while the north, east and south portions have two floors each with a number of rooms about 2 x 3 m in size. Two stone staircases in the courtyard of Khan Al-Wakalah lead to the upper floors. There are thirty-five rooms with arched entrances, barrel or cross vaults on the ground floor and another forty rooms on the upper floors. (Figure 4, Right) (IItma, 2011). Khan Al-Wakalah, owned by the Arafat family, was damaged by a huge earthquake in 1927. It was abandoned in a derelict state until the mid-1990s when the Nablus local municipality acquired it with a view to convert it into a commercial complex complete with shopping malls (Irving, 2011). Although it was bombed by the Israeli army while restoration works were going on, the project was assisted by UNESCO and funded by the European market (2.5 million Euros) and was completed in 2010, i.e. after twelve years. It is now a public building consisting of conference hall, restaurant, and guest house (Figure 5) (UNESCO, ...
In the four years since, the economic returns of the building have been low, and a small number of people have visited the place which is not opened to the public. Also due to the political situation, the usage of the building has been very limited and not risen to the required level. Many voices have been raised calling for reuse of the Khan and offering alternatives to make it more useful to the municipality and public.

The researchers built a team of experts, the team proposed five reuse options to obtain the maximum reuse value of the Khan Al-Wakalah building, taking into account the existing building’s physical condition, estimated profit margins, the location, the servicing, and maintenance. A list of potential reuse options was derived; a museum (V1), a school (V2), a shopping mall (V3), a hotel (V4), and a governmental office (V5). The following analysis shows how the importance and priority of alternatives were obtained.
equal to one. For example the weight matrix of the alternatives for R1 is $T_{21} = 0.292, 0.250, 0.333, 0.042, 0.042$

Table 4: The relative importance of criteria to the alternatives; (a) unnormalized, (b) normalized to 1 for every column (Source: Authors)

<table>
<thead>
<tr>
<th></th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(a)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>V2</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>3</td>
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<td>5</td>
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<tr>
<td>V5</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td><strong>(b)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>V1</td>
<td>0.292</td>
<td>0.212</td>
<td>0.267</td>
<td>0.154</td>
<td>0.375</td>
</tr>
<tr>
<td>V2</td>
<td>0.250</td>
<td>0.212</td>
<td>0.133</td>
<td>0.077</td>
<td>0.125</td>
</tr>
<tr>
<td>V3</td>
<td>0.333</td>
<td>0.182</td>
<td>0.200</td>
<td>0.346</td>
<td>0.083</td>
</tr>
<tr>
<td>V4</td>
<td>0.083</td>
<td>0.242</td>
<td>0.233</td>
<td>0.308</td>
<td>0.208</td>
</tr>
<tr>
<td>V5</td>
<td>0.042</td>
<td>0.152</td>
<td>0.167</td>
<td>0.115</td>
<td>0.208</td>
</tr>
</tbody>
</table>

The five alternatives were then compared in pairs based on all criteria with the weight matrix as $T_{51}, T_{52}, T_{53}, T_{54},$ and $T_{55}$. Data in Table 5 was collected from answers to questions such as, which of the alternatives satisfy R1 by V1 most and in what amount?

Table 5: Data among five reuse alternatives for each criterion

<table>
<thead>
<tr>
<th></th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>Maximum Eigen Value</th>
<th>C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Value (Criterion 1) (T51)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1</td>
<td>0.263</td>
<td>0.314</td>
<td>0.235</td>
<td>0.324</td>
<td>0.280</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2</td>
<td>0.131</td>
<td>0.157</td>
<td>0.157</td>
<td>0.270</td>
<td>0.240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V3</td>
<td>0.525</td>
<td>0.471</td>
<td>0.471</td>
<td>0.324</td>
<td>0.360</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V4</td>
<td>0.044</td>
<td>0.031</td>
<td>0.078</td>
<td>0.054</td>
<td>0.080</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V5</td>
<td>0.038</td>
<td>0.026</td>
<td>0.059</td>
<td>0.027</td>
<td>0.040</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Value (Criterion 2) (T52)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1</td>
<td>0.207</td>
<td>0.207</td>
<td>0.235</td>
<td>0.194</td>
<td>0.231</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2</td>
<td>0.207</td>
<td>0.207</td>
<td>0.235</td>
<td>0.194</td>
<td>0.231</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V3</td>
<td>0.103</td>
<td>0.103</td>
<td>0.118</td>
<td>0.129</td>
<td>0.154</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V4</td>
<td>0.414</td>
<td>0.414</td>
<td>0.353</td>
<td>0.387</td>
<td>0.308</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V5</td>
<td>0.069</td>
<td>0.069</td>
<td>0.059</td>
<td>0.097</td>
<td>0.077</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The five criteria determined the priorities of the TP after the results from steps 2 and 3 were synthetised.

\[ \text{TP1} = \text{T51} \times \text{T21} = \begin{pmatrix} 0.263 & 0.314 & 0.235 & 0.324 & 0.280 \\ 0.131 & 0.157 & 0.157 & 0.270 & 0.240 \\ 0.525 & 0.471 & 0.471 & 0.324 & 0.360 \\ 0.044 & 0.031 & 0.078 & 0.054 & 0.080 \\ 0.038 & 0.026 & 0.059 & 0.027 & 0.040 \end{pmatrix} \times \begin{pmatrix} 0.292 \\ 0.250 \\ 0.333 \\ 0.083 \\ 0.042 \end{pmatrix} = \begin{pmatrix} 0.272 \\ 0.162 \\ 0.470 \\ 0.054 \\ 0.041 \end{pmatrix} \]

The matrix TP was decided by the grouping of the five columns where TP = (TP1, TP2, TP3, TP4, TP5).

\[ \text{TANP} = \text{TP} \times \text{TR} = \begin{pmatrix} 0.272 & 0.213 & 0.438 & 0.077 & 0.553 \\ 0.162 & 0.213 & 0.059 & 0.047 & 0.075 \\ 0.470 & 0.12 & 0.173 & 0.408 & 0.057 \\ 0.054 & 0.38 & 0.235 & 0.387 & 0.157 \\ 0.041 & 0.075 & 0.095 & 0.081 & 0.157 \end{pmatrix} \times \begin{pmatrix} 0.200 \\ 0.135 \\ 0.315 \\ 0.168 \\ 0.180 \end{pmatrix} = \begin{pmatrix} 0.334 \\ 0.101 \\ 0.243 \\ 0.229 \\ 0.090 \end{pmatrix} \]
At the ANP stage, the results which were the actual values of the alternatives were (V1, V2, V3, V4, V5) = (0.334, 0.101, 0.243, 0.229, 0.090), showing that the best reuse option for the Khan Al-Wakalah was as a museum followed by a shopping mall (Figure 6).

DISCUSSIONS
It could be clearly seen how the chosen methodology made easy the process of solving the problem of a complicated reuse selection with many criteria. Application of this particular method also enabled the quantifying of a number of subjective opinions and judgments, a necessary tool in evaluating the varying options of reuse. Using this method gave an edge as it also allowed documentation of the whole procedure and of the working of the expert team, which could then be recorded, related and presented to other relevant, interested parties. Throughout the process, all criteria were given equal consideration, including those that looked unimportant, as these could increase in significance due to the factor of interdependence (Figure 7).

The results in T1 and TR showed that some changes occurred regarding the merit of criteria from the supermatrix on interdependency. The merit of social from 0.109 to 0.200, environmental from 0.116 to 0.135, architectural from 0.422 to 0.315, economic from 0.060 to 0.168, and that of the cultural aspect changed from 0.292 to 0.180. In the study for the Khan Al-Wakalah, the changed values brought about by the ANP and AHP procedures increased to a higher level the economic, social and environmental criteria while decreasing the importance of the architectural angle. Even the cultural criteria took a back seat to that of social. Thus for the Khan Al-Wakalah, the resulting reuse options in order of importance are V1= 0.334 > V3= 0.243 > V4= 0.229 > V2= 0.101 > V5= 0.090, making reuse as a museum the best choice. The function of a museum that is closely related to architectural and cultural perspectives while preserving the building’s integrity and authenticity scored highly in TP and TC.
In all stages of this process, consistency was a necessary factor thus the experts and professionals in the taskforce were made familiar with all the details in the procedure from the very beginning and were constantly reminded of the need to think logically and rationally. This was to prevent occurrence of inconsistency (C.I. > 0.1). The number of objective discussions with shared observations by the team of experts throughout the study led to better results and decisions minus individualistic inclinations. More than five options were actually possible in this method. The above results were only suitable for the particular building in their surroundings, not to be used generally for other buildings with entirely different circumstances and issues in a totally different environment.

CONCLUSIONS

The main objective of this paper is to develop an inclusive methodology based on varying pertinent issues for the optimum adaptive reuse selection of heritage buildings. In the process, the relevant issues were vigorously reviewed by a group of experts and professionals via preservation and sustainable reuse guidelines and concepts. The ANP method gave better, more logical results while allowing the visualisation of every criterion’s effect. This method also highlights the link and interdependence of all criteria involved, an approach seldom used before. An added advantage is the fact that experts and professionals from different backgrounds were able to express their opinions and knowledge in proper discussions and forums which then were referred to when evaluating the criteria.

This led to more easily accepted results, as all avenues would have been looked into carefully and in detail by members in the team. The team can be made up of experts and professionals from different disciplines and may vary according to the situation, location and characteristics of the buildings. The development of user-friendly and intelligent software definitely improves this methodology. The method proposed in this study for historic buildings’ reuse selection is efficient and can be used anywhere in Palestine or even all over the world, irrespective of the historic character of the building, the location, or the historical and political landscape of the region.
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INTERACTION BETWEEN INTERNAL STRUCTURE AND ADAPTIVE USE OF TRADITIONAL BUILDINGS: ANALYZING THE HERITAGE MUSEUM OF ABU-JABER, JORDAN

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Abstract
This paper analyses the three-floor gallery plans of the Abu-Jaber Museum that correspond to the two stages in the evolution of the Abu-Jaber House: 1880, when it was originally constructed to house the families of three affluent brothers; and 2007, when it was rehabilitated into a local heritage museum. Using a multi-method approach of ethnographic observation, space syntax analysis, and interviews, we find that the 2009 spatial and morphological conversion constitutes a certain phenomenological departure from the spatial principles embedded in the original plans. We suggest that this is linked to a predominant approach in the process of adaptive use where the essence of the original spatial configuration is overlooked. We discuss the three-way interaction between spatial structure and its architectural language, interpretations of conservation priorities and curatorial principles.

Keywords: Space syntax; adaptive use; traditional buildings; phenomenology; heritage museum.

INTRODUCTION
The Museum of Abu-Jaber, Jordan, originally three attached houses of an affluent family in the end of the 19th century, opened its doors to the public in 2009. It was rehabilitated as part of a project for heritage tourism funded by international agencies (Al-Masri, 2014). In this paper we discuss the relationship between the historical spatial structure of the building, its circulation patterns, and the adaptive use decisions. We investigate the two stages of the building’s development: first, the original interior layouts as it stood in 1900; second, the layouts designed as part of the rehabilitation (adaptive use) project.

The process that took place represents major and systematic efforts which rehabilitated the spatial composition with minimal inventions in the actual articulations of the original stone walls and their stylized openings and vaults. The commissioned designers responded to the existing architecture, without having an agreed upon curatorial program and within the framework of preserving the physical integrity of the buildings.

The spatial history of the studied building during the 120 years of its life can be investigated from several points of view. First, as a history of the changing spatial requirements, reflected in a set of formal transformations and choices that were brought into play within the constraints of the architectural shell. Second, as a history of different patterns of user experience in relation to the spatial qualities of the layouts. Within the context of the conservation process, this paper will investigate the balance between the ways in which shells are preserved and the design of their space and the salient patterns of use. The intention is to contribute to the understanding of the interdependencies between the different parameters which were involved in the final product. This inquiry addresses the following fundamental question: do the changes in the preserved layouts involve changes in the original underlying spatial organizational principles? In other words, are we dealing with sensitive permutations on the spatial original and traditional organizational principles, or can we identify a fundamental spatial departure from the preserved themes? More specifically, this paper addresses the issue of the arrangement of spaces in relation to: a. the spatial qualities of the original and new layouts, exploring the impact of each on the rhythm of perception; and b.
the patterns of movement, both global and local and their impacts on the experience of the moving observer.

Museums and Heritage

Museums have recently become the center of interest among scholars in many disciplines in what Sharon Macdonald called “the museum phenomenon” (Macdonald, 2006, p. 4). While some scholars have begun examining the museum and its role (Mason, 2006) others intended to draw attention to the ways in which museums are physically encountered and their role both to their intrinsic memorability” (Hoelscher, 2006, p. 204).

In the construction of cultural identity and giving the importance of the place, but in which other places and times are selected or their separation have an impact on how a museum is explored, the extent it engages its visitors, and the level of understanding it shapes. In addition to the curatorial narrative, there is a spatial discourse in the museum narrative is not disturbed (de Gorgas, 2001; Cabral, 2001).

If seen within this context, Crane’s (2006) arguments become of great relevance. She discusses museums from the vantage point of temporality, and argues that the mandate of museums is to preserve and present objects for people to appreciate (Crane, 2006, p98). In regard to the museum as an agent, museums are created to capture “a moment of creativity or cultural significance” thus she warned from “silencing and forgetting” of cultural speech and from loss of collective memory, which takes place when other meanings are generated in their place “using the same objects of reference” (Crane, 2006, p.105). When artifacts are selected to be preserved, it is because “that representation is itself valuable to us ... and essential to secure the reference of the past” (Crane, 2006, p. 108). This becomes of significance when the building itself is an artifact of display, which is the case of house museums.

Fyfe (2006) points out that the museum is a “modality of showing, of telling, and of mediating”, arguing that museums are as cultural as the things they contain” (Fyfe, 2006, p. 35). To Foucault, it is that space which is outside all other places, but in which other places and times are “represented, contested and reserved” (Foucault, 1994). Mason discussed the readability of museums as texts and believed that understanding museums in terms of “texts and narratives” promote the idea that visitors have a crucial role in the process of “meaning-making” and shifts the emphasis towards the visitor as reader (Mason, 2006). Thus, recent scholarship considers the architecture of the museum as a museum itself, since it determines viewing conditions, frames the exhibits, and shapes the visitor experience thus providing meaning to the narrative (Giebelhausen, 2005).

Unlike the designed museum, the historic house museum is adapted from an existing building which simultaneously becomes a container and an artifact. The chief objective in the design of such a building is to ensure the harmony between the building and the collections so that the museum narrative is not disturbed (de Gorgas, 2001; Cabral, 2001).

Hoelscher (2006) touched upon the importance of museums as active vehicles in producing, sharing, and giving understanding of the past. He draws on the unique connection between heritage and place and the ways in which the “sites of memory” give prominent attention to the various ways in which heritage is spatially constituted. He confirms the recognition of the importance of the place and stated that “it is the stabilizing presence of place as a container of experiences that contributes so powerfully to its intrinsic memorability” (Hoelscher, 2006, p. 204-205). He believes when an artifact is removed from its surroundings and is placed in a new taxonomic arrangement, it might acquire a totally different set of meanings, an issue which is very critical in manipulating the spatial experience of the one site itself (the building in our case).

The spatial layout of a museum is of significance for its success. Patterns of accessibility through the space of museum exhibits, their arrangement in groups, or their separation have an impact on how a museum is explored, the extent it engages its visitors, and the level of understanding it shapes. In addition to the curatorial narrative, there is a spatial discourse in the museum, based on the circulation pattern and visibility of spaces (Wineman, Peponis, & Dalton, 2007).
The geometric relationships of spaces and the topology of the parts of the building impact way-finding. Space provides a structure for orientation in museums; as visitors understand their location within the floor plan they will also understand where they are in the narrative that the curator is presenting to them (Wineman, Peponis, & Dalton, 2007). A building’s design is successful if it is legible (Werner & Schindler, 2004; Weisman, 1981). Within this framework, Hillier (1996) introduced the concept of “space configuration” to notate the arrangement of spaces inside the building and how they interconnect and interrelate, creating an overall structure that has an impact on the user’s behavior. The configuration of museum layouts provides a structure for the exploration of the collections and buildings by visitors (Choi, 1999).

**Adaptive Use**

Literature on adaptive use (rehabilitation) is part of a rich discourse on heritage conservation, addressing the safeguarding of heritage places through a variety of strategies. Adaptive use is among the more liberal interventions, compared to restoration and preservation, as it provides allowances for changing the use of the building, which requires deep interventions (Fitch, 1998; Murtagh, 1997).

Adaptive use is defined as “a process by which structurally sound older buildings are developed for economically viable new uses” (Austin, 1988, p. 49). The challenge originates from changing the building’s typology, as churches may become libraries, and houses turn into museums (Powell, 1999). As a profound change, it has been labeled “re-architecture” (Cantacuzino, 1989). This kind of change warrants care in the general approach to allow the needed change without impacting the integrity of the historic fabric of the building. Thus, many scholars of architectural heritage have been critical of this approach due to its impact on the historic integrity and character of the building (Nelson, 2005; Murtagh, 1997; Weeks, 2005).

Literature contends that at a minimum, this approach requires two main steps: 1. The preparation of an architectural design program based on a careful study of the possibilities and constraints of the building, and 2. The identification of necessary alterations needed to achieve that project, taking into account maintaining its architectural features, which may require different levels of interventions (Eyuce & Eyuce, 2010). This raises the questions: What does the careful study of necessary alterations entail? And what are the limits of constraints of intervention? is it merely the form or are there other spatial constraints? RehabMED (2008) identified several steps for the adaptive use for traditional buildings, focusing on local participation and values, place-meaning-making, and sustainable heritage principles. Different principles are provided in this regard so as to maintain the value of the place without damaging its significance by maintaining its value, integrity, and historic character (The National Register of Historic Places, 2002; ICOMOS Australia, 1999). As shown below, we argue for the understanding of the juxtaposition of the formal and spatial structure, and the spatial experience offered by the original design as one of the starting points for rehabilitating such buildings.

**METHODS**

This paper uses a case study approach, utilizing multi-methods in order to analyze and understand the interrelationships of adaptive use with spatial experience of a heritage museum. The study proceeded in a qualitative manner, as questions were raised at each stage based on analysis and observations, and new investigations developed to answer the questions.

The architectural qualities of the layout of the Abu-Jaber building were examined by looking at their compositional principles in terms of their: configurational properties, vertical and horizontal agglomerations, circulation systems, scales of organization, spatial interventions and patterns of exploration.

“Participant observation” was used to document how visitors behave in the museum. Sixty university students and professionals were observed on a floor-by-floor basis. It was carried out during the period of April through July 2013, and September-October 2013. Each visitor was given a disposable camera in order to record his/her own route and the duration of their visit.
Five semi-structured interviews were used to triangulate the analysis and observations. The interviews were supported by data obtained from documents, such as exhibit panels, project reports, and heritage studies of the city of Salt.

Several site visits were conducted in the period (April 2009- February 2014), which allowed for better understanding of the current and past museum spaces. The site visits allowed for detailed assessment of the plans, sequence of the narrative, spatial characteristics, and possible circulation patterns. The researchers took notes of their observations and discussed them in-situ, sometimes casually asking local staff for clarifications.

**The Heritage Museum of Abu-Jaber**
The Abu-Jaber house is a significant residential compound in the city of Salt, the former capital of Jordan. It has significance as the location where Prince Abdullah resided upon the founding of Jordan as a state 1923 (figure 1). Further, it is one of the finest examples of a merchant house in the 19th century, incorporating architectural detailing from the greater Syria region in addition to Europe. Its architecture represents the golden age of Salt, when the city was the hub of commercial, political, social, and artistic activity. It was built in stages incorporating the courtyard house and the three bay houses in its floors (Abu-Jaber, 2009; Al-Masri, 2014).

**The Architectural Qualities of the 1890 Layouts**
In 1892, the construction of a 700m2 plot for the Abu-Jaber family’s three attached multi-story houses began. Inspired by the architectural traditions of the greater Syria area, the layouts are mostly composed of bounded rooms defined by traditional double-leaf stone masonry walls (60-100 cm), cross vaulted ceilings, elaborate arched openings and fresco-painted ceilings. Special attention was made to the details of stone work whether at the main facade, projected balconies, stairways, or cornices. Italian roof tiles were used to stylize the external pitched roofs and their three open-court pathways. Large, elaborate, and stained-glass windows occupied the northern main facade and introduced subtle amounts of daylight. Squared, arched, and diminishing-in-size openings are located at the southern elevation which faces the natural slope (Abu-Jaber, 2009).

The key spatial property of each of the layouts is the centrality and the revolving tendency of the user’s movement. The spatial structure of each house is created by one concentric vertically-revolving axis which is a continuation of a vertical deflected shaft that terminates at the upper level, forming a warmly lit open court (Figure 1). This vertical axial shift allowed the creation of the central enfilade of the rooms at the lower floors (Figure 2). Open courtyards added to the lighting intensity and quality in each of the three houses, creating light wells of the internal central zones. Three consecutive vertical axes run through the east, intermediate, and west houses (Figures 1,2) and structure their spaces.

The layout also brings together a number of compositional principles: houses are organized to suggest a clear experiential movement; the overall rotational direction of movement is perceived through wall openings and internal windows. In the west house the composition even allows multiple internal and external views from the varying distances which draw the viewer into different patterns of exploration. At some locations the space is exposed to diverse scales of organization, ranging from the double volume spaces to the intimate and private spaces. All these principles embody the formal ideas cultivated in the vernacular traditional architecture of the region which includes: co-presence, the filtering of light, hierarchical spaces, and momentary intersection of gazes.

**The Architectural Qualities of the 2007 Adaptive Use Layouts**
An examination of the plans of the new museum (figure 1) shows that the new layout accomplished three things. First, by stopping the vertical movement axis which used to connect the two floors of each house, it practically (yet not physically) eliminated the multi story circulation loops. Second, by introducing a new door opening at the backside rooms of the three houses, a new axial-deflected
disjunction was created and made the transition between the original houses awkward. This transformation created a more determinate circulation system and aimed at imposing a more rigid viewing sequence upon visitors on the one hand, and maintaining the physical integrity of the other rooms on the other. Third, by introducing a main entrance at the ground floor level (originally used as stores and services), it incorporated the west spaces of this floor to the spatial composition of the museum. Fourth, by adding an elevator shaft at the southern end of the intermediate house, the circulation system across the floors and starting point of the first and second floors was reinvented. The new layout restricted the impact of the older stairways as the new circulation system integrated only the west house’s second stairway as an option to connect the second with the first floors. It also reintroduced the original shared entrance of the “intermediate and west” houses as an alternative entrance and as an option to the use of a stairway to access the first level. This entrance cannot be interpreted as a mere return to the 1900 original entrances (figure 1).

The emphasis on the horizontal movement allowed the creation of a central enfilade of rooms. The new orbit axis of the museum follows the linear arrangement of the rooms along the north facade. Although the themes of the vertical transition were almost eliminated, the secondary original and vertical older residential axes, originally at perpendicular angles to the new major one, are still phenomenologically active and make the transition confusingly felt.

Each floor’s axis now crosses through the three older houses; spatially it is composed of a series of varied-in-size rooms and corridors. It narrows and widens across the east-west direction and runs through, varied-in-scale, across vaults and ceiling compositions. Architecturally, a new visual play with the perspective construction is created. The new doors introduced at the walls originally separating the older houses at the back side, (formerly a small bed room leading into another room through the central aisle -originally saloon with multiple cross vaults), the arched single or sequenced varied-in-size openings along the northern and southern internal walls, along with the impact of the shorter vertical axes with their penetration of light, offer fragments of visual information and spatially guiding sequence. The changes in the visitor’s views are monotonous; the visitor does not change views of partially exhibited examples of Jordanian history, but entire works become visible or disappear within the museum’s rooms. Only in the main axis are the wide and tall arched openings of the central aisle viewed in perspective. The visual play is enhanced by the fact that the preserved forms and stonework are of high architectural value. It could be said that the powerful impact of the architectural forms counteract the lack of clear spatial variety and differentiation that would engage the visitor.

Given this, the questions to be pursued in subsequent sections are whether the forces that had united and composed the older phenomenological impression of the different and hierarchal sizes of spaces are still in order? Did the new building succeed in creating an enjoyable ambiance and a combination of hierarchical controlled spaces? Have the new functions and their interrelationships been translated into an aesthetically satisfying balance of preserved setting and clear interior spaces which effectively serve the needs of both the visitor and the preservation?
Figure 1. Drawings of the original houses and adaptive use
(Source: Tiba Consultants, 2007; Redrawn by authors)
How is the Abu-Jaber museum working now: the pattern of exploration and the configurational clarity?

Visitor observation showed that all visitors used the main entrance, and started their visit from the ground level where all turned right attracted by the visual distinction of the perspective and the penetration of light at the end of the double volume and multi-arched vista of the ground floor (figure 1, figure2/3). Furthermore, observations have shown that all visitors went back to the entry point and ascended to the first floor to initiate, as proposed by the museum staff, their first floor’s tours. Once in the first floor 45% of the visitors observed turned right and started their visit through the east side (figure 1, tour1). About sixteen percent (16.7%) moved along the west axis (figure 1, tour 2). However, a count of the pictured images showed that visitors did not reach all exhibits (dubbed function spaces, Table 1).

Two observations are noticed: First, visitors start moving normally and then express confusion: They move randomly, returning to the same spaces or missing parts of the museum. Second, the spaces that seem to lie outside the search track of visitors are those connected to the central space of the older houses at either of the extreme east or west ends which they did not reach.

<table>
<thead>
<tr>
<th>Number of function spaces reached</th>
<th>% of people</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-12</td>
<td>20%</td>
</tr>
<tr>
<td>8-10</td>
<td>58.3%</td>
</tr>
<tr>
<td>Less than eight</td>
<td>21.7%</td>
</tr>
</tbody>
</table>

Table 1: number of people who reached function spaces (Source: Authors)
To elucidate, people enter the first floor from the midpoint (figure 1). Upon entering the first room (middle-point space; figure 2/1) visitors grasp the immediate convex space, build up a picture of the visible museum space, and its spatial structure. They have then the choice between the east perspective axis (tour 1), and the slightly shorter axis that stops around (tour 2). Encouraged by the flat level at their east, compared to the multiple steps to their west, most visitors move through the rooms of the east side, following the confronted openings (tour1).

Moving along any space seems to take them either back home to the original starting point too quickly (tour 1), or if they like to take the risk, they venture towards the stepped pathways, which they confronted when they entered the main space of the first floor, reaching point A.

Up to that point people follow the lines suggested by the interesting architectural compositions. The difficulty lies in deciding the continuation of their route when they find themselves at the middle of extremely similar architectural compositions (figure 1, point A; figure 2/2) since they find themselves in spaces very similar to the ones they had experienced (i.e. the central space of the third house similar to the central space of the first and second house). At that point (point A), visitors get puzzled and lose their sense of orientation and move inconsistently. Some backtrack, returning to the same spaces, or they move in a non-systematic way missing some parts of the floor. However, if they take the risk and decide to continue the journey due to the light rays penetrating through the grand balcony and the integrated view of the city at the west end, they move and enjoy again the double-volume space (tour 3). A large percentage of observed visitors end their journey at this floor thus missing the second floor.

**An Analytical Profile of the Spatial Structure of the Abu-Jaber: 1890s, 2007 layouts**
The analysis will now move from the general description into more particular spatial properties of the museum, addressing circulation as a key element of the layout’s morphology.

**The ordering of spaces into sequences and justified graphs**
With reference to the results of the observation, the question addressed at this point is, what are the museum’s spatial reference points and what is the role of the original gathering spaces (central spaces) of the older houses? Do they still have meaningful functional value? Are there any differences that arise from the way these older spaces are embedded in the new global system? What is the impact of the new cores if any, on the user’s movement in the whole system and how do they correspond to the original shell? The goal behind these inquires is to understand and communicate the hierarchy of relationships in preserved buildings, and the nature of the new developed perception of the space. To make these strategic differences of movement and its underlying spatial structure visually clear, we suggest representing the houses’ and museum’s layouts as schematic justified graphs (Figure 3 and Figure 4), where nodes are used to represent a space. Lines are used to capture the logical relationships between spaces (i.e nodes), so that a node is selected outside the entrance to denote the starting point, and then all other nodes are aligned in layers above it.

If we examine the plans and their justified graphs, we find several interesting features. There are always gathering spaces which serve as spaces for setting out from or returning to. Linked to these locations are several spaces which are not necessarily hierarchal in terms of their built up size or in their shape of boundary space. In the houses’ layouts, these spaces can be walked through without getting lost. In their justified graphs, this manifests itself as a limited amount of rings or bushy spaces which interconnect to each other and eventually lead back to the gathering space (Figure 3).
Figure 3. (Left) spaces and justified graphs of the original first floor of each house (Source: Authors); (Right) spaces and justified graphs of the original second floor of each house (Source: Authors)

Conversely, in the museum, these spaces are weakly sequenced; the size and shape of their built boundary space is not hierarchal. They cannot be walked through without back-tracking or getting lost. In the justified graphs (figure 4), this shows itself as a large number of rings or bushy spaces. This incongruity between sequences, sizes and back-tracking could be seen in the following nodes and routes; the ground floor’s Reception (node 2 in figure 4-a) and its adjacent elevator’s lobby small space (node 5) originally the corridor to a utility, ("The Geography, Agriculture
& Cultural Landscape” in the first floor) (node 26 in figure 4-b) and “Museum Staff” (node 7 in figure 4-b), originally, the morphological central spaces of the original houses are now exhibition spaces and part of the whole layout. The route of the distinguished architectural experience of (nodes 26, 27, 28, and 29 in figure 4-b), originally the central event in the west house, was in fact missed by many visitors (as the observation study showed).

Figure 4. (Left) spaces of the different floors of the museum (Source: authors); (right) justified graphs of the floors of the museum (Source: authors)
Analysis has shown that the pattern of the different space types/forms in the layouts had affected the building’s degree of integration and consequently its global perception. Analysis of the older houses clarified that there has always been a gathering space: a central space that guides and distributes the user along the different spaces (figure 1 and 2). Due to the limited numbers of choices that this central gathering space controls, the criticality of the size and hierarchy of these spaces was not of influential value and did not affect the global comprehension of the one house.

However, in the museum as a whole, analysis showed that the existence of several nodes (spaces) within each floor- spaces of large and/or small built up areas that might be of a distributive character or not- made the connotations of size and shape and how these were embodied in each case of crucial importance. The hierarchy that was marginally controlled by the central space of each house is now missed. Its relational proportion was comprehendible due to the limited degree of existing variability. On the other hand, the hierarchy of those gathering spaces at the museum spread across the whole length of the building. This does not encourage the explorative aspect of the visitor’s movement. On the contrary, it has reduced people’s ability to grasp the overall structure of the museum.

**The pattern of space**

The research will use now the ideas of syntax theorem to investigate if the new layout creates positive configurational interrelations between the old spaces and the new functions, or on the other hand, is it a layout of a series of connected central spaces that creates a friction to the user’s visual and spatial experience? How was the Abu-Jaber building “re-architectured” towards its new use? Is it a static preserved shell that controls the visitor’s processional journey, or a dynamic new arrangement of spaces which enhances the exploratory aspect of the visit both spatially and intellectually?

The results of our analysis are graphically presented in (Figure 5). The syntactic centrality refers to areas from which the plan becomes more readily accessible, visible and intelligible, (as distinct from shape-geometric centrality, the region which is simply “in the middle” of a plan-shape). In the
1900s plans, the points associated with greater visible and accessible area, as well as with greater visual integration and integration of access, include, most prominently, those near the circulation areas and the multi-cross vault receiving spaces. In the west (third) house, this syntactic centrality occupies a larger area and extends to the balcony which is architecturally a pivotal and distinctive region within the layout as a whole. Each of these centers provides both views and access into the peripheral spaces. Within each of the individual houses these spaces act as orientation points within the floor, and help in concentrating the movement and guiding it up into the second floor. What these results suggest is that, the 1900 architectural compositional principles juxtapose with the spatial syntactic qualities, thus making the spaces interesting and easy to grasp.

In adaptive use plans the same areas maintained their syntactic importance. However, the museum’s architectural plan represents an attempt to orient visitors with respect to the linear extension of the building as a whole. The results show (Figure 6) that each syntactic central hub has maintained its role as a space of reference for those moving in the local (not global) peripheral spaces. What is unusual in these results is the fact that each of these syntactic centers is visually isolated from the other syntactic centers within the floor and that there is no access or integration core that connects those centers. In contrast, those integration centers are surrounded by extremely weak accessible, visible and weak intelligible areas all of which counteract the movement within the museum and negate the expected linear accessibility of the museum’s floors.

![Figure 6. Visual integration of museum’s floors (red as the most visible points and blue the least visible points)](Source: authors)

While the adaptive use architectural layout adopts a new circulation system and represents an attempt to move away from the emphasis on centrality and centripetal forces of the original plan to a continuous reference point for overall navigation and experience, the syntactic properties seem to contradict this intention. The main axis ceased to act like the spatial center of the museum as a whole. Although the new curatorial suggestion seeks to create a linear procession; the older
narrative of the house scenario and vertical penetration seems to still dominate. Maintaining the older hubs of syntactic centrality in fact encourages the older vertical movement to the upper floors but it is not supported by the adaptive use plans. This eschewing of the older centrality is further complicated due to the penetration of light, and the hierarchical un-clarity of the sizes of spaces.

These characteristics are clearly demonstrated from a point location in both the single house as a detached entity and the museum as an aggregated space (figure 7). Results also show that despite the three zones of syntactic centrality (central spaces; figure 2) there has been neither an architectural nor a compositional connection with the beginning of the route. In fact the new spatial composition of the museum did not benefit from the vistas of distinctive locations, nor did it continue the older phenomenological spatial thesis (figure 7). Thus, the Abu-Jaber museum lacks clarity of spatial structure. Visitors did not grasp the spatial morphology of the museum and did not manage to track their journeys back.

Figure 7. (Left) Isovist from a point location in a single house compared to the aggregated museum space (source: authors); (Right) visual field of the museum at main circulation spaces (source: authors)
The Spatial Strategies of Display

To better understand the design intention, the spatial strategy of display was reviewed. The museum has many stories to tell. The galleries include: the golden age of Salt, Salt in its regional context, education history, medical history, municipal history, archaeology, geography, agriculture and culture, architecture in the 1900s, significant houses, and the Salti house (which includes: the kitchen and food exhibits, dining room, bedroom, courtyard, living-area and related style of social life). The exhibits constitute a mediating force between the experience of the current city and the museum.

When looked at in conjunction with the galleries, these displays do not impose any clear sequence. The ways in which the stories are narrated do not appear to have been in the design brief nor do they suggest a notion of a single coherent story, or the possibility of multiple narratives. According to the curator the current sequence of the narration was determined after the visitor path was designed (Al-Masri, 2014). The path suffers from having several intersecting loops, thus is not followed by the visitors. When discussed with the curator, it was clear that the final arrangements for the exhibits had yet to be reached. This hesitation resulted due to the lack of a defined narration strategy at the early design phases.

The investigation revealed that there is no close integration between the spatial structures of the galleries, the spatial structures of the entire buildings, or the spatial strategies of display. The design does not use space to serve any clear narrative, an issue which hampered the creation of a rich spatial and aesthetic experience. The lack of visual relationships with the courtyards and the way they integrate with the room galleries does not advance the idea of the museum as a dynamic field of interesting routes. It becomes very clear that the chaos in spatial organization of the new museum was not dictated by an imposed narrative- curation.

DISCUSSION AND CONCLUSION

The analysis showed that the spatial morphology of the original building prompted an activity of positive visual experience in the observer. The flow of the spaces kept the observer anchored perceptually throughout his journey. It analytically showed how, the original experience of each of the houses examined had created visual engagement and encouraged the observer to explore the building. This positive experience, the analysis shows, does not fully hold in the new design. Gathering spaces, which were key elements in the relatively shallow core of each house floor, became part of the museum’s deeper sections as the new design abruptly sequenced them to the rest of the spaces of the houses. Contrary to the original houses’ functional concentric integration and visual visible cores, the museum’s integration and visual visible core do not organize the whole layout or spread out, nor do they link the smaller courts on the east, intermediate and west sides of the one floor. The original embedding of several clear and powerful central spaces has critically affected the whole itinerary and confused choice at the global level, making way-finding difficult.

In fact, people move locally and cannot grasp the global structure from the entrance; the local conditions have a bigger affect than the global layout. Further, the vertical axis which used to link the two floors within each house now creates a false perspective and a misleading visual play that negatively affects the visitor’s route. Observations showed that people are hesitant and confused at each sub cycle and always question where to return to continue their journey. From the syntactic point of view, the gathering spaces of the new museum did not develop an efficient clear integration center. By implication, these centers did not fully succeed in maximizing the opportunities for co-presence and encounter. The original embedding of several clear and powerful central spaces has critically affected the whole itinerary and confused choice at the global level. It may be argued that the designers’ concentration on preserving the original shell limited them from viewing the whole picture of the livable museum of shell and space. Thus, clear tension arises between the global and the local properties of the museum’s space. The fact that visitors are unable to orient themselves with respect to the layout as a whole underscores the way in which the design mediated the building shell and the spatial qualities of the building, an issue which the “re-
architecture” missed. By detaching the conservation interventions from the uniqueness of the original configuration of space, a loss of meaning occurred.

This is in contrast to the original houses where cores are interconnected, and circulation choices are restricted on the local scale. This reinforces their role as ordering devices and contributes to their presence regardless of their actual built-up size. This older experience regains its strength at the entry level of the museum where the designers located the entrance at the heart of the new layout allowing by such allocation the experience of the original double-volume space to be short-looped. Despite the designers’ attention to providing spaces for experiencing architecture at several locations (i.e. coffee shop and adjacent balcony), the late introduction of such spaces within the long-looped experience of the museum diluted the quality of that experience.

The purpose of this comparative study goes beyond examining the successful creation of a functional or clear sense of perceived space into appreciating the qualities of the original spaces that were initially available through experience. By focusing on the factors that had a role in shaping the user’s experience, it tried to unravel what Bafna and her colleagues focused on when they stated that “It is not in abstract properties of visual artifacts that their imaginative power lies, but rather in the choice and manipulation of the specific set of cues that are brought into play ... the manipulation of visual cues can be obtained not just by articulating the building structure, but also by articulating the spatial organization and controlling vantage points.” (Bafna et al., 2009, p. 11). In that sense these ideas could provide designers with a better understanding of the consequences of the strategic decisions they make when dealing with historic locations and encourage new ways of handling internal environments.

Our findings suggest that the preserved museum cannot be used in a clear way. Movement through the spaces requires an understanding of the way in which local parts are interrelated into a whole pattern, a concern that was neglected. Furthermore, no efforts were made to respond to the new spatial morphology or to the perception of the new space. Neither architectural gestures nor major internal interventions were made to guide the visitor’s path or to suggest guided transitional clues, an issue that might be related to the conservation strategy.

Adaptive use remains challenging as it changes the functional system in an existing building designed for a different use. Conversely, this paper argues for a change in the way of thinking when approaching the rehabilitation of existing buildings. It encourages refinements in the way some strategic design decisions are made and encourages a new way for handling space. Although the architectural conservation interventions enhanced and used the architectural compositional potentials of the shell, the power of space itself and the potentials of its spatial and ambient morphology seem to have been neglected as attention was awarded to the preservation of the integrity of fabric, leading the designer to minimize physical change. As such, the designer opted to take the visitor in a circulation pattern that ignored the original space syntax. The analysis shows that the phenomenological issues might be unseen agents at work. Space characteristics, overall geometry, private vs. public, and front space vs. back space all provided a holistic experience. Neglecting such unseen aspects in the re-architecture of heritage buildings results in a schism in the connotations of the spatial experience. Thus, there might be a gap, an arbitrary relationship, between architectural and spatial languages.

This paper bridged areas of adaptive use and museums using space-syntax analysis methods. Its combined methods offer a unique approach to investigate museums in general and heritage buildings in particular, offering as such new possibilities for improving design. It is of relevance to architectural historians, designers, and museum curators.
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SUSTAINABLE SPACES WITH PSYCHOLOGICAL CONNOTATION: HISTORICAL ARCHITECTURE AS REFERENCE BOOK FOR BIOMIMETIC MODELS WITH BIOPHILIC QUALITIES

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Abstract

Biomimicry is a growing area of interest in architecture due to the potentials it offers for innovative architectural solutions and for more sustainable, regenerative built environment. Yet, a growing body of research identified various deficiencies to the employment of this approach in architecture. Of particular note is that: first, some biomimetic technologies are not inherently more sustainable or Nature-friendly than conventional equivalents; second, they lack any spatial expression of Nature and are visually ill integrated into it. In a trial to redeem these deficiencies, this paper suggests a framework for more sustainable strategy that combines this approach with the relative approach of "Biophilia", with reference to examples from historical architecture. Using pioneering strategies and applications from different historical styles, the paper shows that the combination of these two approaches may lead to enhanced outcomes in terms of sustainability as well as human psychology and well-being. In doing so, architects may go beyond simply mimicking Nature to synthesizing architecture in tune with it and bringing in bio-inspired solutions that is more responsive to human needs and well being.

Keywords: Biomimicry; Biomimetic architecture; Biophilia; Biophilic design; Sustainable design

INTRODUCTION

Architects have long taken inspiration from Nature. They borrowed the shapes and proportions of natural forms ever since as they strived to achieve aesthetic perfection. In Ancient Egypt columns were modeled on palm trees and lotus plants, so were classical orders modeled after Acanthus leaves, spiral shapes and human proportions.

Nature is also still an inspiration source for contemporary architects, who keep trying to connect with it and learn from it; taking different pathways, bio-mimicry, bio-gnosis, bio-philia, and bio-morphology all have the same concern, but with different priorities, weightings, and principles.

Biomimicry, as developed by Janine Benyus in 1997, is one of these approaches that encourage the transfer of functions, concepts and strategies from natural organisms or systems to create a resilient built environment and improve its capacity for regenerative systems (El Ahmar, 2011). A lot of buildings today started to incorporate such features in a pure functional format that, unfortunately, lack any natural expression and with components that mostly look unpleasing.

As present in Nature, design is not a collection of parts, but a synthesis of a whole. To respect and care for Nature, people have to obey, not only its functions, but also its patterns and forms. Not surprisingly, this way of thinking may lead to buildings that are more sustainable, where sustainability goes hand-in-hand with a respect for Nature. In explaining this concept, Salingaros says: "Part of humans' perceptive system looks for information, whereas another part looks for meaning…. By imposing an artificial meaning on the built environment, contemporary
architects contradict physical and natural processes, and thus create buildings and cities that are inhuman." (Salingaros and Masden, 2008)

Therein, on the other part of Nature-based design spectrum, Biophilia or biophilic design stands as a way of integrating Nature's own characteristics, principles, and patterns into the immediate environment of human beings. Applicable to all kinds of buildings, where people live, work, or learn, Biophilia is referred to by S. Kellert, as "the missing link in sustainable design", which "aims not only to reduce the harm that stems from the built environment, but also to make the built environment more pleasing, enjoyable and healthy". (Kellert et al., 2008)

But, contrary to biomimetic design; in biophilic design the building itself does not necessarily function cohesively with Nature, although its architectural expression is derived from it. An exclusive focus on biophilic interventions is not also an automatic guarantee for a higher level of well-being, as long as it is to remain apathetic for ecological issues.

The origins of the theory of Biophilia lies in the 1980s-writings of Edward O. Wilson, but the earlier roots of this theory is to be traced in the works of Christopher Alexander. In his 1977-book A Pattern Language, Christopher Alexander and his colleagues tried to answer the question of "quality" in space by gathering examples of buildings and places throughout the world that evoke a sense of order, robustness, and comfort; identifying and explicating 253 physical qualities, or patterns, that they considered to be the essential ways to solve architectural basic design challenges. They called this "a language" because they form a type of grammar, where the patterns were linked to one another, showing which ones worked well together and arranged hierarchically from large to small. As Grabow explains, this "pattern language phase" centered on the "a particular quality of space that one can actually see as well as feel" (Grabow 1983).

In his 2002-05-four volumes of The Nature of Order, Alexander paid further effort to incorporate life-evoking geometry and step-by-step construction process that sustains environment and place well being in the architectural space.

In The Nature of Order, Alexander amended the mostly static patterns of A Pattern Language by more dynamic sequences. He advocates "wholeness", as the "source of the coherence" (Alexander, 2002). Wholeness, he says, is integrally related to other lived qualities like beauty, eloquence, good health, well being and -most integrally-vitality and "life". He attributes life in any system, to the wholeness of this system, identifying 15 properties of centers that contribute to achieving wholeness and life in architectural composition; these are: levels of scale, strong centers, clear boundaries, alternating repetition, positive space, good shape, local symmetries, deep interlock and ambiguity, contrast, gradients, roughness, echoes, voids, simplicity, not separateness (Alexander, 2002).

And despite Alexander did not directly talk about "Biophilia" or "biophilic design" in any of these writings, N. Salingaros, one of the most prominent theorists of Biophilia, used Alexander's rules and patterns as basis for his approach to biophilic design (Salingaros, 2014). Some recent works, such as R. Bhat's "Understanding Complexity Through Pattern Languages", M. Mehaffy's "Counting Urban Carbon", and J. Kalb, "Life In Design" gave some further insights about how Alexander's Patterns anticipated biophilic design.

This paper's argument is that the improvement of architectural performance, where the whole is greater than the sum of the parts, is in need to reach a balance between the tangibles and the intangibles to produce a stronger wholesome. It suggests an architectural design approach that puts the two sides of the spectrum together by supplementing biomimetic applications with biophilic qualities. To achieve this, it aims at finding architectural strategies that combines these two approaches together in resilient applications that achieve the functional targets of Biomimicry, while keeping the livable expression and the psychological qualities as proposed in Biophilia; i.e. what K. Harries describes as: "the sheltering power of place and the indefinite promise of space" (Harries, 1997). By bringing together science, geometry, humanities, and architecture, the paper aims at finding a design approach that holds both functional design and spatial expression in tension, neither privileged over the other. This approach allows, on another hand, a compensation of the initial costs of biomimetic technologies by the economic
benefits of biophilic architecture, which had proved to be very effective in terms of improving human productivity, reducing sick days in office workers, and therewith raising profits (Browning et al., 2012).

In quest of specific strategies and settings for achieving the twofold target of this approach, the paper's hypothesis is that historical architecture is a valid platform and reference book for simple, low-cost and clever methods and solutions for the suggested approach.

A qualitative methodology, with purposefully selected examples and case studies that typify certain characteristics, was employed in this paper in order to seek observed and illustrative support for this hypothesis. Other than the mere formalistic imitation, the selected examples show that ancient architects had always drawn inspirations from natural creatures around them, for both beauty and functionality, in early appearances of both Biomimicry and Biophilia, hundreds of years before these terms were coined. They demonstrate how historical architects made use, not only of the functional and structural efficiencies, but also of the patterns and cycles of life, in: honeycomb, cacti, termites, trees …etc, to create an architecture that sprout, grow, and harmonize with surrounding environments.

The paper is structured as follows: an introduction, three main parts, and a conclusion. In the introductory part, an overall view of the notions of the paper is introduced. In the second part, a theoretical background about the two approaches is overviewed, while in the third part, certain strategies and settings, as obtained from historical architecture, are explored to show both the biomimetic applications and the biophilic qualities in each of them. The results of this analysis are then discussed in part four, and the findings of the research are summarized in the conclusion.

BIOPHILIA AND BIOMIMICRY: BEYOND SUSTAINABILITY, DESIGN FOR WELL-BEING

Biologist Stephen Boyden (1971) defines the optimum healthy environment as the conditions, which tend to "promote or permit the optimal physiological, mental, and social performance in its natural or 'evolutionary' environment." Boyden's discussion of well-being raises two main concerns: (1) there is a mismatch between humans' evolutionary environment and current industrialized settings, and (2) this mismatch is detrimental to human well-being because current environments do not support the full range of evolved survival and well-being needs.

He argues that environments need to fully satisfy both "survival needs" and "well-being needs" and defines the criteria that should be addressed to satisfy these needs in the built environment as the following:

i- Think beyond survival to well-being
ii- Build on "primitive preferences" and connections to Nature
iii- Design for the senses as well as the body (Boyden, 1971)

Biophilic architecture is a contemporary philosophy of architecture that supports these tendencies and seeks solutions for sustainability in Nature, not by replicating the natural forms, but by understanding the rules governing those forms. The origins of this approach lies in the theory of Biophilia, which contends that human health and well-being has a biologically-based need to affiliate with Nature (Wilson, 1993). Advocators of Biophilia believe that it has more to offer than simply making buildings look good. They believe that it is "the missing link in sustainable design" (Kellert et al., 2008) and that "while reducing the energy use of buildings is essential for a sustainable future, it is equally important to improve the conditions in which humans live, work, play, heal etc...". (Kellert, 2005)

It has been also proven that people depend on the presence of these qualities in the environment not only for the sense of belonging and wellbeing, but equally for existence, as a primal source of the so-called "neurological nourishment" (Salingaros and Masden, 2008). The mechanism for this nourishment was discovered in neurological studies, from which it has been concluded that humans have an innate craving for certain type of information that is associated with the brain’s pleasure centers, which also control the reduction of pain (Biederman and Vessel, 2006).
Biophilic design, as developed by E. O. Wilson, acknowledged the advantages of forms inspired by biological structures, but in a more profound way than simple mimicry. Wilson's original idea was extended and applied to architectural design by Stephen R. Kellert in his book, in association with J. Heerwagen and M. Mador, "Biophilic Design", which is considered to be the bible of this discipline. In this book, several models had been developed by different theorists, such as Salingaros, Kellert, Hildebrand and others, to suggest qualities and characteristics of spaces that may fulfill humans' needs to affiliate with Nature. The most prominent, and the simplest, of these models is the one suggested by Kellert himself, as developed from studies by the Psychologists Judith Heerwagen and Betty Hase. In this model he defined the following qualities as basis for the Biophilia-effect in the built environment (Kellert, 2008):

- **Prospect**: brightness, wide horizons, or ability to see into a distance
- **Refuge**: sense of enclosure and shelter with canopy effect or branch-like forms overhead
- **Livability and movement**: with real moving water or reflecting surfaces
- **Biodiversity**: vegetation elements or symbolic representation of them (trees, plants, or flowers)
- **Sensory variability (or ephemeral qualities of space)**: changes and variability in environmental color, temperature, air movement, light, texture…etc.
- **Fractals**: self-similarity, natural patterns or cycles, hierarchal characteristics
- **Sense of playfulness**: elements that aim at delight, surprise, or dazzle
- **Enticement**: complexity and richness of details to be seen, or gradual openness of views.

Empirical findings on psychological advantages of natural environments, and environments mimicking their geometrical qualities, on human wellbeing were documented in several studies by Salingaros (2003), Salingaros and Masden (2008), Biederman and Vessel, (2006), Joye (2007), Kellert, (2005), Hagerhall, Purcell, and Taylor (2004), Purcell, Peron, and Berto, (2001), Taylor, (1998), Harris (2012), and Browning et al. (2012). (See (N. Ramzy, 2015) for full overview of these empirical findings). However, despite of these empirical evidences that show the positive effect of biophilic design on individuals, tracking and measuring efficacy of biophilic patterns and parameters or metrics is still challenging. This is due to the high number of variables, shifting baselines, the unpredictability of the built and natural environments, as well as the highly invasive nature of some data collection techniques (Ryan, et al., 2014).

However, this concept is sometimes misunderstood and commonly confused with **Biomimicry**, which promotes copying functional systems and processes of flora, fauna or entire ecosystems in Nature to find efficient solutions to design problems or to provide cooling, generate energy, desalinate water…etc.

The term **biomimetics** was coined by Otto Schmitt in 1982 (Vincent et al., 2006), but nobody tried to actually apply it until it was re-discovered by Janine Benyus in her 1997-book, *Biomimicry: Innovation Inspired by Nature*, where she advocates looking to Nature as a "Model, Measure, and Mentor" and emphasizes sustainability as the main objective of Biomimicry (Benyus, 1997).

This concept is also often misrepresented as creating a building that looks like something natural, i.e. a building shaped like a pinecone, which is another different approach in design called **Biomorphology**. Mimicking natural systems or processes would sometime have an effect on form as well, but that is not the main point in Biomimicry (Biomimicry 3.8, 2012).

The most obvious and common type of Biomimicry is the emulation of Nature’s **function**. Emulating Nature on the process level is another form of Biomimicry, which involves learning from the way Nature produces things or evolves. The third variety of Biomimicry looks at Nature’s systems; this area examines how Nature deals with things like waste and regeneration inside closed-loop lifecycles. There are, hence, three levels of mimicry; organism, behavior and ecosystem. Buildings on the organism level mimic a specific organism. Working on this level alone without mimicking how the organism participates in a larger context may not be sufficient to produce a building that is more sustainable than a non-biomimetic building (El Ahmar, 2011). On the behavior level, buildings mimic how an organism behaves or relates to its larger context. On
the level of the ecosystem, a building mimics the natural process and cycle of the greater environment.

Within each of these levels, further five possible dimensions to the mimicry exist: form, material, construction, process, function (fig. 1). Table 1 demonstrates the different levels of Biomimicry with the five dimensions within each level (El Ahmar, 2011). These levels are not mutually exclusive and some overlap between them is always expected.

Figure 1. Levels and dimensions of Biomimicry (Source: Author)

Table 1: The applications of Biomimicry (after El Ahmar, 2011)

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavior level</strong></td>
<td>Mimicry of how an organism behaves or relates to its larger context</td>
</tr>
<tr>
<td>Form</td>
<td>looks like it was made by an organism.</td>
</tr>
<tr>
<td>Material</td>
<td>made from similar materials that an organism builds with.</td>
</tr>
<tr>
<td>Construction</td>
<td>made in the same way that an organism would build in.</td>
</tr>
<tr>
<td>Process</td>
<td>works in the same way as an organism mound would.</td>
</tr>
<tr>
<td>Function</td>
<td>functions in the same way that it would if made by organism.</td>
</tr>
<tr>
<td><strong>Ecosystem level</strong></td>
<td>Mimicry of an ecosystem</td>
</tr>
<tr>
<td>Form</td>
<td>looks like an ecosystem (an organism would live in).</td>
</tr>
<tr>
<td>Material</td>
<td>made from the same kind of materials that (an organism) ecosystem is made of.</td>
</tr>
<tr>
<td>Construction</td>
<td>assembled in the same way as an (organism) ecosystem.</td>
</tr>
<tr>
<td>Process</td>
<td>works in the same way as an (organism) ecosystem.</td>
</tr>
<tr>
<td>Function</td>
<td>able to function in the same way that an (organism) ecosystem would.</td>
</tr>
<tr>
<td><strong>Organism level</strong></td>
<td>Mimicry of a specific organism</td>
</tr>
<tr>
<td>Form</td>
<td>looks like an organism.</td>
</tr>
<tr>
<td>Material</td>
<td>made from the same material as an organism; exoskeleton / skin for example.</td>
</tr>
<tr>
<td>Construction</td>
<td>made in the same way as an organism or goes through similar growth cycles.</td>
</tr>
<tr>
<td>Process</td>
<td>works in the same way as an individual organism.</td>
</tr>
<tr>
<td>Function</td>
<td>functions like an organism in a larger context.</td>
</tr>
</tbody>
</table>

In these classifications, the shapes and patterns of Nature do not come anywhere and are not a priority at all. So the user for this kind of architecture will probably not have the chance to actually experience any features, qualities, or relations with natural environment as suggested in the biophilic design approach.

BIOMIMETIC APPLICATIONS WITH BIOPHILIC QUALITIES IN HISTORICAL ARCHITECTURE

While the terminology of these two disciplines is relatively new, the actual practice of both Biomimicry and Biophilia has been going on since very old times. Mankind has learned many lessons by observing other creatures and adapting their behaviors for human's own needs, while artists and philosophers have always looked to natural organisms as offering perfect models of harmonious balance and proportion, as synonymous with the classical model of beauty. The
qualities of wholeness, integrity, and unity in structure are central concepts in the Aristotelian view both of living beings and of the best works of art.

In the same direction, architects and designers have always looked to biology for inspiration since the beginnings of the science. They have sought not just to imitate the forms of plants and animals for their beauty and gracefulness, but to find methods in design analogous to the processes of growth, evolution, and structural stability in Nature.

In the following the ‘biomimetic’ dimensions in some models from historical architecture are discussed and compared with some prominent contemporary biomimetic models, showing that the former are not only equally efficient in terms of biomimetic functionality, but also have the additional privilege of Biophilia-effect.

**On behavior level**

On the behavior level, the building mimics how an organism interacts with its environment via a structure that can fit in without resistance in its surrounding environment, or a specific type of behavior that the organism does or replicates on a regular basis to survive or adapt with its context.

**Mashrabiya screens**

The Qatar Cacti Building is one of the prominent applications of biomimetic approach in architecture, where the sun shades on the windows open and close in response to heat, just as the cactus undergoes transpiration at night rather than during the day to retain water.

![Figure 2](image)

**Figure 2.** (a) Operable windows permit the low-angled winter sun to penetrate, while giving protection from the high-angled summer sun. (b) Difficulty of adjusting straight blinds (after Fathy, 1986). (c) The curvy surfaces of latticework obstacle sunrays, while permitting airflow.

When the suitable sensors-technology is to be added to it, the 'smart' design of *Mashrabiya* screens (window-screens that were used in traditional Middle Eastern architecture), would provide more efficient model, with the following advantages: The operable windows in Mashrabiya screens permits the low-angled winter sun to bring daylight and warmth to the interior spaces during the cooler months of winter and gives shade and protection from the high-angled hot summer sun, while allowing the cool air from the street to flow through it (fig. 2-a). Latticework, with smaller opening in the lower part and larger openings in the higher parts, causes the draft to be fast above the head and slow in lower parts, providing a significant amount of air moving in the room without direct uncomfortable draught on the users' level (fig. 3). Furthermore, the curvy surfaces of this latticework help to overcome the difficulty of adjusting straight blinds, where the position for the optimal direction of air movement is undesirable with regard to sunshine and vice versa (fig. 2-b). These curvy surfaces also have the advantage of being able to obstacle the sunrays, while allowing the largest amount of air to enter the space with the least obstruction (fig. 2-c).

On another hand, and unlike the system in the Qatar Cacti Building, Mashrabiya screens would add the following biophilic qualities to the building: The patterns of the latticework would...
add the fractal quality to the space, while the projection of the Mashrabiya would add the quality of refuge with its alcove-like form (fig. 3) providing also a place for water features (it used to be a place for cooling water-jars). With air coming from three sides, it has the ability to capture natural ventilation, even if the draught outside was parallel to the house facade, providing air movement and sensory variability as well as prospect through a wider horizon with three-sides-view. A row of projected Mashrabiya screens would also provide shelter and refuge for those in the streets.

Further advantage of Mashrabiya screens is sustainability, as it gives the producer the capability to make use of the smallest pieces of wood, which helps reducing the loss in rough materials to the lowest level and enables using low-quality local woods in its fabrication.

Figure 3. Mashrabiya screens from the House Al-Sohaimy, Cairo: (Left) Fractal patterns of Latticework with smaller opening in the lower part and larger openings in the higher parts. (Right) alcove-like arrangement (Source: Author)

Gothic towers

The biomimetic approach for the proposal of Mark Sarkisian for China World Trade Center began by investigating the cross-section and the growth patterns of the bamboo. It was found that its most important attributes are: a high strength-to-weight ratio, elasticity, long-term endurance, and a highly efficient form that resists loads and maximizes stability. These qualities are achieved in bamboo by organic bracing that is capable of fragmenting forces by sharing loads more uniformly within the structure and transferring them into the roots (Sarkisian, 2011).

Figure 4. Bamboo concept for tall building: (a) The inter-nodes spacing and the overall frame of bracing, (b) Gothic towers, (c) fractal patterns in Gothic towers, and (d) tracery bracing at the tower of Cologne cathedral (Source: Author)
In the bamboo, the nodes or diaphragms, as seen in rings over the height of the stack, are positioned to prevent buckling of the thin bamboo-walls. They are also not evenly spaced; they are close at the base, further apart through the mid-height, then close again near the top (fig. 4-a). These diaphragm locations are not random, but rather mathematically predictable; it was found that the spacing between them depends on a ratio that is close to the Golden Ratio (Sarkisian, 2011). But, again, by looking at the design models of this proposal, any hint to its Nature-based inspiration cannot be realized, and it lacks therefore any biophilic qualities.

By exploring the design of Gothic towers, it is easy to realize that they have the same rules of the bamboo-growth (which is probably the growth patterns in plants in general) and the features of its structure in terms of height, bracing, articulation, and spacing (fig. 4-b), in addition to the qualities of Biophilia-effect. The most obvious one of these qualities is the fractal patterns (fig 4-c); the combination of the growth pattern as seen in the bamboo-structure and the fractal patterns is very logical because fractal patterns are also kind of growth-patterns governed by hierarchy of scales.

Gothic tracery, which provides an outer structural frame of these towers, replicates the strong mesh of the bamboo's outer organic bracing. Furthermore, with the comparatively large cross-section of these tracery, it acts as an integrated self-shading device controlling excessive heat gain and glare in the summer months (when sun angles are high), while the spacing between them permits low winter sun angles to bring daylight and warmth during the cooler months (fig. 4-d). And while acting as shading-device to add the quality of shelter and refuge, these traceries are also shedding the qualities of biodiversity via their floral/foliage shapes and the quality of enticement through their complexity and richness of details.

**On ecosystem level**

Building on the ecosystem level involves mimicking how the components of an organism work together as a multiple-elements-system rather than a solitary element.

**Traditional Arab houses**

A prime example in biomimetic architecture is the Eastgate Centre in Harare, Zimbabwe, which adapts the termites' mounds ecosystem as an analogy for climate-control (Elmahdi, 2008) (fig. 5).

A termite mound was studied by architect Mick Pearce to solve the complex problem of heating and cooling a large structure. He found that termites' mounds are self-regulating systems, where hot air rises and flows out through vents at the top of the building and cooler air is drawn in at ground level (Manlutac, 2007). To stimulate induced flow, the Eastgate Centre makes use of fans to draw cool air into the atrium. Connected to these fans is a centralized duct distributing air to each floor (Benusa and Friend, 2008). The heat generated from thermal mass, occupants and machinery drive the thermosiphon flow (Chimney Effect) upward toward the ducts and chimneys (Turner and Soar, 2008).

Figure 5. Termite mound temperature regulation and section through Eastgate Centre showing how temperature is regulated (based on: Manlutac, 2007 and El Ahmar, 2011)
Similar ideas, which depend on passive ventilation, were recognized as early as 450 BC by Socrates (US Department of Energy, 2014). The Pantheon design is one of the earliest buildings that employed this strategy.

In this building, air interacts with the oculus through both convection (Stack, or Chimney Effect) and Venturi Effect. The oculus, in addition to being the 'eye' of the building that brings natural daylight into it, creates a vacuum as air rises by natural convection and the portico entrance is the inlet for cool air at the bottom of the building creating an upward-moving air current (fig 6-a). Air enters the space on the ground level and as it warms up it rises and escapes the structure from the opening (Stack Effect) just like in the termite mound, while the domed shape forces air passing over the oculus to increase in velocity, resulting in a decrease in pressure (Venturi Effect). Near the portico, the air is slower, which increases the air pressure. The difference in air pressure creates airflow from high to low pressure -- from the portico to the oculus.

![Figure 6](image.png)

(a) The oculus opening and domed shape allow for both Chimney Effect and Venturi Effect.
(b) The Badgirs in the teahouses in Kerman, Iran (Source: Author)

A later application of passive ventilation from historical architecture is the Badgirs (Farsi) or Barajeels or Malkaf (Arabic), which are wind-catchers that catch the wind from different directions with two to eight openings (fig 6-b); the air is then cooled as it travels down the tower, and cools the rooms below. When there is no wind, the hot air in the tower rises up, which draws cooler air from any other openings into the house (Chimney Effect).

![Figure 7](image.png)

(a) Climatic regulator system in medieval Islamic houses, (b) thermal mass behavior and the climatic cycles in courtyard-buildings (c) The atrium in multi-story buildings as ventilation shaft.

Figure 7. Natural ventilation in medieval Islamic houses through a system of Malkaf, dome/lantern and courtyard (Source: Author)
In the medieval Islamic houses these two elements (the dome and the wind-catcher), were employed, together with other elements (e.g. the courtyard), in a unified eco-system that kept the temperature in these houses moderate. Wind catchers in these houses are oriented to catch fresh breeze from the north and lead it into the house and court (fig. 7-a). On the other side, they lead away the warm air, maintain steady ventilation and thus by low air pressure trace fresh cold air into the buildings. Here, the courtyard functioned as a temperature regulator. When there is no wind, hot air in the tower rises and draws cooler air from the courtyard into the rooms (Chimney Effect). The dome or the lantern, over the central part of the house or the court, increase the velocity and result in a difference in pressure that creates airflow from high to low pressure (Venturi Effect), where the opening(s) in them acts as an outlet for hot air. A water fountain is often added at the middle of the court for more refreshing effect. Water tanks or food containers were also put under the wind-catchers as a method to cool drinking water and store food.

A further element in this passive system is the thermal mass, which refers to materials that have the ability to store thermal energy for extended periods of time such as stone, mud, brick, water and ceramic tile. The walls of traditional Arab houses were mainly made of brick and were very thick. During the day, the walls absorb daytime heat, reducing the amount of heat that reaches the interior space, and resulting in a cooler interior air temperature. The thermal energy absorbed by the thick walls is then negated at night through the airflow of the passive ventilation system (fig. 7-b) (Hein, NA). Marble or glazed floors were also part of this passive design system together with the above mentioned effect of Mashrabiya-screens (3.1.a); they all contribute to the overall effect. The application of this system on a multi-story building is illustrated in (fig. 7-c)

In addition to these biomimetic-climatic potentials, the passive system in Arab houses has also several biophilic qualities that are not found in the system of the Eastgate Centre. The form of the dome is believed to have been inspired by the shape of the egg (Pawlyn, 2011), and, in this sense, it provides a sense of shelter to the inhabitants. Its canopy-like structure is factor of the biophilic quality of refuge. The central dome is also an element of the Theory of Centers, which is one of Nikos Salingaros's strategies of complicity and order (Salingaros, 2010). The dynamic light obtained through the openings in the base of the dome or lantern travels from one place to another in the space, which is, together with the air movement resulted in by the dome-Malkaf-arrangement, features of the sensory variability (Ramzy, 2013). The courtyard is one of the prominent strategies for the biophilic quality of prospect and with its vegetation elements it also provides biodiversity, where water elements and glazed surfaces provide livability and movement. Hence, this system actually provides an almost full biophilic system that fulfills most of the biophilic qualities included in Kellert – Heerwagen model of Biophilia.

**Gothic arced system**

In his 2009-book *Bio-Structural Analogues in Architecture*, Joseph Lim emphasize that every form in Nature is essentially the product of the diagram of forces acting, or have acted, on it. Based on this diagram, he put his so-called *biotectonic-model of structure* (Next Nature, 2013 & Lim, 2009).

Other studies in biomimetic structures by Henry Coe State Park, suggested the turtle's bone structure as a biological model that offers great possibilities of structural hybrids. The analogy drawn from the turtle's bone structure is that it provides protection strategy that differs from that of running animals with stronger support of the heavy body and smooth gradient and transitions between the different elements of the structure, offering possibilities for differentiated spatial qualities (Regenerative Leadership Institute, 2012).

Searching for a structural system that combines the qualities of these both systems (Park's turtle and Lim's biotectonic-system), it had been found that Gothic structural system is a perfect model, where "each component is a product of the force's diagram acting on it", and while giving "strong support to the heavy body", these elements are "composed in perfectly smooth skeleton" that competes with that of the turtle's bone structure (fig. 8).
Before Gothic era, architecture was defined with the formation of three elements: floor, wall and roof (Thiis-Evensen, 1990). These terms have been exchanged by gothic builders with an innovative 'biomimetic' trend of skin-and-skeleton structure. Gothic techniques produced truly skeletal structures that were composed of arches, ribs, piers and flying-buttresses, where forces are adequately balanced and neatly channeled towards the buttresses and foundation with minimum material consumption.

Gothic pointed arch carried combined strength and elegance almost as far as it could be carried, but the concept of unlimitedly growing architecture is to be attributed to the different variations of Gothic ribbed vault, which -very much like the turtle shell, and unlike all previous types of vaults- does not systematically crack (Lourenço, 2009).

The skin/skeleton analogy here is drawn from two natural principles: the first of these was the concentration of strains upon isolated points of support, which was made possible by the substitution of groined/ribbed for barrel vaults. This led to a corresponding concentration of the masses at these points; so that the building was as if "upon legs" (Thiis-Evensen, 1990) (fig 9).

The second principle was that of balanced thrusts. In Gothic architecture thrusts were as far as possible resisted by counter-thrusts from the flying-buttresses that were further weighted by pinnacles (Thiis-Evensen, 1990). So, the wall and the roof became a mere filling-in (skin) between piers, ribs, and the buttresses (bones).

Furnished with this system, Gothic architects actually competed with Nature in terms of structures; unlimited heights and spans were available, while splendid materials were not anymore necessary. As birds and bees build their nests, medieval architects did not have to quarry marbles or stone and did not have to transport expensive materials from far countries or colonies; they worked rather with poor quality bricks, mortar, and all kinds of materials available
in their local environment. Shabby and scrappy materials were able to attain amazing results and the smallest piece of materials was able to function somewhere.

Sustainable use of building materials did not concern only hidden structural elements, but also visible ornamentations. For example the Cosmati style of decoration (fig. 10), which was used in the most prestigious churches (e.g. the Westminster Abbey) was a technique, where the smallest piece of materials could be used. Without strict patterning, it allows easier matching of tiles, minimum discards and flexible choices, all ultimately resulting in waste reduction. Stained glass is another application in the same direction, where small pieces of glass were used to cover large areas of openings.

In addition to this Nature-based biomimetic structure, Gothic style has the ability to offer another almost full biophilic system that fulfills the following qualities: prospect and refuge via high ceiling in the main area flanked by lower aisles on the sides with canopy and tree-like forms overhead; fractal patterns in the self-similar patterns all over the building (Goldberger, 1996); biodiversity through ornamentation and symbolic representation of all kinds of vegetation and elements of Nature, livability and movement in reflecting surfaces, light reflections and stained glass; and enticement in the complexity and richness of ornaments and details (fig 11).

On organism level
This level refers to mimicking a specified organism. On this level, the building or part of it, mimic a specific organism or part of a whole organism.
Velarium

Spider’s web is a tarpaulin-like load-bearing system that lets the spider spread its web wide, while still making no concessions as to its strength. This marvelous technique has been mimicked in many contemporary structures; Munich Olympic Stadium, the Sydney National Athletic Stadium, and Denver Airport in Colorado are allegedly some of them.

The Velarium, which is a retractable, canvas-like paneled system of ropes and masts that shielded the spectators at the Colosseum in ancient Rome from sun and rain, is a much older and cheaper application of this technique. In addition to providing shade for the spectators, its sloping design was meant to create a ventilation draft. It consisted of two hundred and forty mast corbels that were positioned around the top of the attic to support a net-structure, carrying a retractable awning (fig. 12) that sloped down towards a hole in the center to catch the wind and provide a breeze for the audience (fig. 13). When it was not in use, the shades were pleated back on themselves, much like modern Roman shades (Bay of Screens & Shades, 2014).

Stalactite-works and Honeycombs

In biology, modularity refers to the construction of a cellular organism by joining together standardized units to form larger compositions. One example of this modularity in Nature is the cells in a honeycomb (El Ahmar, 2011).

The construction of honeycombs offers a great many important advantages, including stability. As the bees in the hive give directions to one another, they set up vibrations that, in a structure of such small dimensions, can be equated to an earthquake. Nature magazine stated...
that architects could use this superior structure in designing earthquake-proof buildings (Yahya, 2006).

- like Islamic architectural ornamentation (fig. 14) appeared in the early 12th century to overlay the transitional zone between domes and the squinches or brackets under them. Later on, it became also a usual decoration for door heads, niches, and the bracketing under cornices and minaret galleries.

In addition to these functional aspects, the fractal patterns of the stalactites and the enticement in their complexity and richness of details evoke the biophilic character on them. It was also found that they can function as acoustic baffles to decrease echo sound reflection (Harmony of the Spheres, NA).

**Eiffel Tower and structure of bones**

In the early 1850s, the anatomist Hermann von Meyer saw that the inside of the thigh bone, which is capable of withstanding a weight of one ton when in a vertical position, consists not of one single piece, but contains an orderly latticework of tiny ridges of bone known as *trabeculae*.

In 1866, the Swiss engineer Karl Cullman visited von Meyer's laboratory, where the latter showed him a piece of bone he had been studying. Cullman realized that the bone's structure was designed to reduce the effects of weight load and pressure. The trabeculae were effectively a series of studs and braces arranged along the lines of force generated when standing. As a mathematician and engineer, Cullman translated these findings into applicable model that was later developed by Gustave Eiffel in the design of the Eiffel Tower, where a lattice of studs and braces are used to support the curved structure of the tower (Yahya, 2006) (fig 15). So, it could be said that this tower is in fact the earliest actual application of Biomimicry in architecture.

Thanks to this design, the tower also required fewer materials (sustainability), and made for a building framework that is both strong and flexible. The fractal geometry of the design together with the enticement evoked by the complexity and richness of its details granted it also a biophilic dimension.
RESULTS

The results of the discussion in the previous chapter are summarized in table 2, which shows that, although the terminologies were still unknown, biophilic qualities were strongly present, side by side, with biomimetic functional/structural applications in all the above mentioned examples, where the three levels of Biomimicry, with variations of the five dimensions included in them, were all applied and the whole spectrum of biophilic qualities was covered.

Biophilic qualities:
The most prominent biophilic quality that was present in almost all of these examples, except for the Velarium, is the fractal patterns. Prospect, refuge and sensory variability were also strongly present. With six out of eight qualities for each of them, the Biophilia-effect as defined in Kellert-Heerwagen model has very strong presence in the two examples of "medieval-ecosystems": the medieval Islamic house and the Gothic arcuated system.

It is worthy here to mention that these examples also cover the three categories of Human-Nature relationships: Nature in the space, Natural analogues, and Nature of the space (Ryan et al., 2014). The first refers to the presence of elements from Nature, such as plant life, water bodies, etc. within the built environment, which is found in the model of Traditional Arab House; the second refers to objects, materials, colors, shapes, patterns and algorithms that evoke Nature, such as seen in the Stalactite-works; and the third refers to spatial configurations and associated psychological and physiological responses associated to natural environment such as prospect and refuge, such as seen in the Gothic arcuated System.

Biomimetic/Sustainable Applications:
Compared with the contemporary applications in biomimetic projects, models and applications from historical architecture show that they are not only equally efficient in terms of biomimetic functionality and more considerate to the Biophilia-effect, but -furthermore- they are more sustainable. In Mashrabiya screens, the smallest pieces of wood could be used, reducing the loss in raw materials to the lowest level, while the arcuated system in Gothic style brought the buildings on legs with a sustainable construction approach that makes use of the smallest piece of building 'local' materials, even those which are shabby or scrappy, for both structural and ornamental elements, with no need for expensive non-regenerative or exported materials. The fractal design of Eiffel tower also enabled economic use of materials.

The discussion in 3.2.a shows also that the contemporary biomimetic climatic treatment in the Eastgate Centre is almost typical to that of the medieval Islamic houses in terms of the functional technique. Yet, the latter had been proven to be more sustainable, energy-saving system, where the wind catchers are factors of Chimney Effect (the same as in Eastgate Centre), while domes are factors of Venturi Effect, which made it possible to naturally draw cool air into the space and dispense with fans, as those in the system of Eastgate Centre, by the more biophilic, energy-saving element of domes. The thermal mass in these houses was an additional aid for temperature regulation. This example shows that, better than starting from zero by studying the biological creatures themselves for biomimetic applications, architects have their own reference book of historical styles, in which they can find ready-for-use biomimetic treatments and bio-inspired functional models.

The discussion in 3.1.a shows also that the design of the Mashrabiya screens is a 'smart' design that is more sensitive to human comfort than the contemporary system in Qatar Cacti Building. The Latticework in these screens, with smaller opening in the lower part and larger openings in the higher parts, provides a significant amount of air moving in the room without direct uncomfortable draught around the users. Further 'smart' aspect of this design is the curvy surfaces of the latticework that help to overcome the difficulty of adjusting straight blinds, and allow them a selective obstruction for sunrays that does not include the obstruction of air movement. With aid of modern technologies of sensors, like those used in the Arab World Institute in Paris, this system may offer better potentials for human comfort.
Climate-control was found to be a dominant feature in several treatments in the previous chapter, even those that were not meant as climatic treatment. The (mainly) structural model in the Gothic towers, for example, was found to be also offering an integrated self-shading device to deal with excessive heat gain and glare in the summer months, while permitting low winter sun angles to bring daylight and warmth during the cooler months. Novel technologies and materials are able to provide buildings with great structural potentials using the format of these towers for tall buildings.

Cost efficiency is another privilege of historical models over contemporary ones. The spider-web analogy of the Velarium was found to be the origin of the system in contemporary stadiums but with more benefits and much lower costs. The lightness and the low cost of such a structure make it also a possible solution to linen other structure for the sake of acoustical enhancement.

Acoustical advantages are also offered by two other treatments: the high angled ceiling in the Gothic arcuated system and the Islamic Stalactites. The main concern in vaulted ceilings is avoiding the focusing that happens directly under the peak. This was unintentionally handled in Gothic vaults, where the peak is continuously interrupted through differences in heights and highly ornamental treatments (as it is also in the case of Stalactites) and the ribs work as buffers that decrease echo sound reflection and do not allow such focus to happen.¹

¹ ‘Reverberation’ sometimes occurs during music performances in these cathedrals due to the great heights and not to the form of the vault. This reverberation is sometimes favorable for musicians because without such ‘ring’ music becomes ‘dry’.
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<td>Enticement</td>
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<td>Eiffel Tower</td>
<td>Organism: thigh bone Form – Construction</td>
<td>Structural element</td>
<td>Fractal</td>
<td>Repetition and self-similarity</td>
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<td>Economy of materials***</td>
<td>Richness of details</td>
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** Similar contemporary projects
*** Additional utility
CONCLUSION

The perceived failure of Modern Architecture is usually attributed to its preoccupation with functional design approach, where ornamentation was done away with and the buildings were cloaked in a stark minimal appearance, which failed to meet the human need for comfort both for body and for eye, as it did not account for humans’ desire for beauty and details. The rejection to this style was finally justified through scientific research, which explained why people are so engaged to certain features such as ornaments, colors, and details. Long misinterpreted as a superfluous element in design, these elements were recently found to be a distillation of geometrical connective rules that directly trigger positive neurophysiology (Salingaros and Masden, 2008).

By referring or relating bio-inspired or ecological design theories, only to the functional models in Nature, contemporary architects are making the same mistake of modernist architects by neglecting the core subject in Nature, which is the aesthetics and the visual pleasure in its patterns and arrangements. Looking at the forms and patterns of Nature as if they have no function is the version of 'minimalism' in natural-based or bio-inspired designs and is equally mistaken as looking at ornaments as if they have no function.

Correlating and combining both the functional and the visual/aesthetical aspects in Nature is suggested in this study as a new approach that is firmly rooted within the Nature-paradigm. In this direction, the study addresses a bi-polar, bio-inspired approach to architectural design that combines the functional aspects of Biomimicry with the psychological qualities of Biophilia. With specific models and applications that integrate the modeling of behavior/function together with the reproduction of the spatial experience and the positive psychological effects of Nature, it offers an outline or a framework for this approach. In a sense, only separate applications and models are presented here, and it is up to creative minds to work out a complete structure with these tools.

In quest for simple, cost-effective and hands-on models and applications, with possibilities and potentials in the both directions of Biomimicry and Biophilia, and rather than starting from zero, by studying natural biological creatures themselves, historical and traditional styles were explored, as shown in part 3, for this purpose. The results in part 4 and table 2 show that historical architecture is a valid reference book that is able to provide architects with pioneering models for this approach, which were unintentionally created as an inevitable result of the ancient architects' direct observations from Nature. So, the paper gives some validity to the idea that architects have their own reference book -- the book of historical styles, in which their predecessors had already put their contribution in terms of both Biomimicry and Biophilia in the form of ready-for-use solutions. New technologies of sensors, hoists, software...etc., is all what architects need to 'translate' this reference book into a contemporary modernized language and further investigations in different historical styles should be performed by architecture historian and researchers to come up with other Biomimitic/Biophic models from this "reference book".

It had been also shown that some of these examples have more sustainable qualities in terms of materials' use and consumption, making use of the smallest piece of local regenerative materials, even those with not very good quality. Acoustical qualities and 'smart' designs for environmental control were also recognized.

One concern, which might be voiced here, is that the approach introduced here relies somehow on specific knowledge and tools that are obsolete and not anymore available. True as this may be, it needs to be seen within the context of the insufficiency of current trends that lakes the aesthetic and psychological qualities of Nature and the benefits of this approach for people's psychology and well-being. In this, the paper refers to the ability to develop these historical systems into dynamic responsive systems that may respond to human needs for comfort, energy, and climate responsiveness by use of modern technologies. This, being applied to architecture, it will becomes possible to develop buildings that are strongly related to and affected by their
surrounding environment, and are much more satisfactory in terms of functional, psychological, environmental and sustainable design.

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