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Designing the Future House: Parameters Juxtaposed

Abstract
The house is a universal necessity that responds to basic human needs. However these needs evolve and change with society. The future dwelling must be environmentally sound, flexible and capable of adapting to the different needs of today's evolving population; but above all it must remain affordable. These parameters will be analyzed and juxtaposed on their overall affect on the design of tomorrow's dwelling drawing from examples and statistical data from UK and the USA.

Keywords: Dwelling, future house, design parameters

Introduction

What does home mean today? Traditionally, the idea of home identified a shelter in opposition to the outer world. The concept of home was also strictly related to that of family. A house accommodates basic needs such as feed, sleep, social interactions within the family, as well as educational and emotional needs.
The last century has seen the transformation of the house as a building to represent also the social status of its inhabitants. It has been enriched with technology to provide comfort and entertainment, and more recently it has added the function of work/office.
The recent financial crisis has highlighted the importance of limiting the cost of construction and maintenance since the design of houses.
The paper aims to identify parameters and their influence on the design of tomorrow's dwelling.

House design and functions

Originally, the house was a self-contained building, built to serve as a shelter from the elements. Traditional construction techniques, local materials and regional topography have greatly guided its design along with cultural influences and social family models. The elderly often joined the nuclear family and even livestock needed to be accommodated.
Since the industrial revolution, the population started to concentrate in cities. This, and lack of land availability, has led to the design of vertical living or otherwise known as apartments. These have become extremely popular since 1870, since Richard Morris Hunt's Stuyvesant Apartments in NY. Comparing the cost of building, furnishing, cleaning, and repairing apartments came as a bargain with respect to private homes. A "domiciliary revolution", as the New York Times described it in 1878_1, had taken place: the change represented the triumph of pragmatism over prejudice. Young couples could now afford a bright new place in town. Families no longer needed to spread out to the villages miles away from city and working centers.
The most "exploited rooms" in a house have traditionally been the kitchen and the living room. In many cultures, the living-sitting room with its social function represented the heart of the house. In others, the kitchen as the place to prepare and consume the family meals was of most importance.
In modern times, although the rooms in a dwelling maintain their traditional roles, there is a progressive broadening of their functions. The kitchen is no longer just the place to prepare and consume meals, but has also become the place to watch TV, read, and entertain friends and family. The sitting room, the most formal space in a house, has also broadened from socializing and entertaining to home office. Often the two rooms have been merged together in a single multi-purpose ambient.
The outdoor space has also been brought inside the house and at the same time has taken outside some of the house functions (feeding, entertaining, relaxing) becoming an integral part of the dwelling.

Contemporary living trends and design parameters

The evolution of the house is not an accident. It is strictly linked to the shift from a society based on traditional manufacturing industry to a services-based society. This process has brought a fundamental change in the way housing is designed and located.
Large industrial cities based around mining and manufacturing sites are not needed anymore, and the one existing are searching for new meanings, e.g. becoming cities of culture, technology, banking and media. Old cities, and houses, have to transform and reinvent themselves.
The new businesses are largely non-polluting, or at least not as the factories of the industrial

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era were. They are smaller in scale and requiring far less space and traditional infrastructure (canals and roads) to prosper. This has changed the housing concept and the sense of permanence has evolved. Smaller villages, abandoned following the industrial revolution, may be again economically sustainable. Therefore, the transformation will reach and affect also the countryside.

At the same time, families look less and less at jobs for life. Workers become a more fluid currency between businesses and more people migrate within the same country, or beyond, to seek work. This has brought also, as indirect consequence, that families are also reducing in size. In order to make realistic proposals the basic model of a home built for one family must have the ability to adapt and expand as a family.

Modern society is becoming increasingly more conscious of its relationship with the environment. This process is also affecting house design such as the choice of materials, construction techniques and compactness of design. The sustainability aspect has also brought the integration of heat and electricity production using sun, wind and ground energies.

The above parameters (affordability, flexibility, adaptability and sustainability) will be juxtaposed to the current trends for dwelling (house, apartment, etc) with data from two strong and indicative global design and construction markets, the USA and the UK.

Current house design trends in the USA

According to the American Institute of Architects[2], downsizing has been the dominant theme for the housing market in the USA over the past several years (illustration1). As falling house prices pushed the number of foreclosed properties to record levels, new homes have been getting smaller and more affordable.

People are interested in living in smaller spaces that are closer to downtowns rather than larger houses where they are dependent on their cars.

Reflecting the desire to keep homes affordable in the current weak housing market, home layouts have generally been simpler and floor plans more flexible. Additionally, as our population ages, accessibility has become a growing concern; the common trend being a single-floor design and clever storage is of demand (illustration2).

There will be the need to create, inside the house, personalized spaces, "houses in the house". To unify and merge these different areas, materials lights and colors will be employed. Technologies will be increasingly present in the house, will contribute in their decor and will determine the furnishing of some spaces.

Outdoor living continues to be popular (covered outdoor space, outdoor rooms and outdoor cooking areas). A related trend, blended indoor/outdoor space, was also reported as growing in popularity (illustration 3).

Recent surveys outlined that the house will assume a more public dimension, thanks to old and new technologies: it will be less protagonist of leisure time, which will be spent outside: urban facilities and metropolitan areas will have to turn into "outer houses".

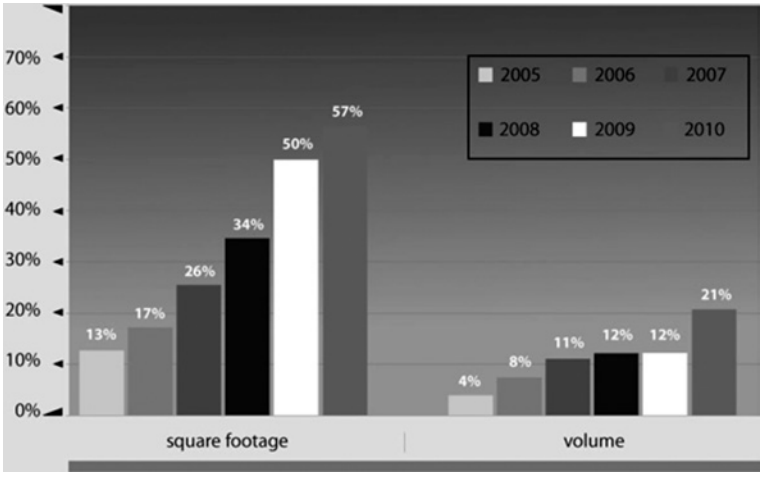
Energy efficiency, as extra insulation remains very popular since it has immediate implications in energy and money saving. Top of the list are energy efficiency products such as high-performance windows, as well as low-maintenance products for flooring, siding or decking are adopted widely.

Energy management systems, solar panels/PVs are also growing in popularity. Growing reliance on technology is influencing consumer choices in the house.

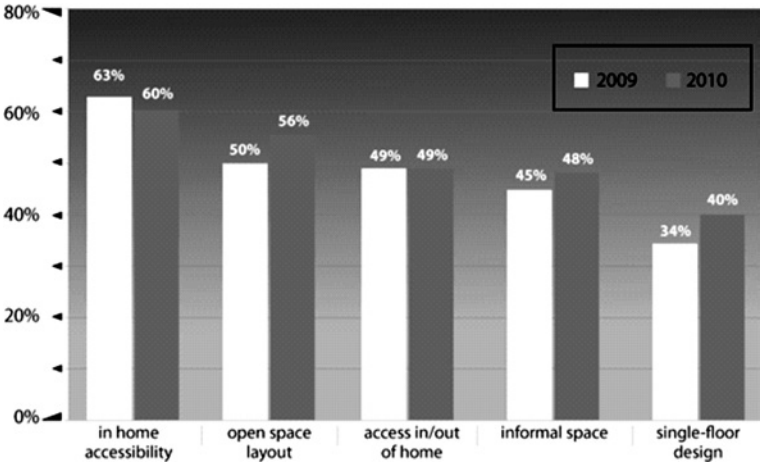
Low maintenance homes and yards are another trend (i.e. xeriscaping), as also and sustainable features such as rainwater catchment.

Current house design trends in the UK

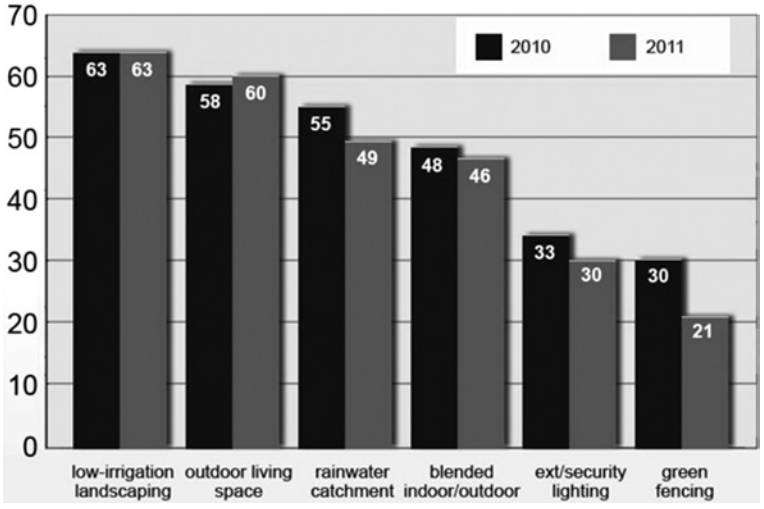
According to the Department for Communities and Local Government, the UK housing scale has shrunk over the last 100 years from the average large house of 320m^2 to 223m^2 and terraced 3-bedroom house from 94m^2 to a 2-bedroom 60m^2 house[3].



il. 1. Percentage of practices reporting downsizing in dwelling design, American Institute of Architects (http://www.aia.org/practicing)



il. 2. Percentage of practices reporting specific requirements in dwelling design, American Institute of Architects (http://www.aia.org/practicing)



il. 3. Percentage of practices reporting increase of specific requirements in dwelling design, American Institute of Architects (http://www.aia.org/practicing)

In large cities, traditional houses are being subdivided into flats. 4 or 5 bedroom terraced-houses are split into self-contained 1 or 2 bedroom units. This is a very sensible financial move for the owners of the properties and changes the nature of the neighborhoods, which are now dominated by 1 and 2 bedroom flats and less suitable for families.

In addition there is an existing building stock, which was built to deal with the demands of industrial post war Britain. Often these buildings are difficult to retrofit to a standard of comfort and usefulness to make occupying them in the 21st century and beyond, more realistically affordable and environmentally sustainable, this makes up over 90% of the residential building stock in the UK.

In addition to these factors we have to consider the environmental impact of the building fabric and the energy consumption of all the elements of housing, the services supplied to them, from water consumption through to transport and electricity. The effect being that it in the UK the housing stock is increasing[4].

The main challenge in the UK is how to build the right kind of new housing cheap enough to make it affordable to the people that need it most and also environmentally sustainable so subsequent generations can make good long term use of what we build today and not waste the embodied energy that goes into the initial construction.

Parameters juxtaposed

The recent economic crisis has raised attention on the **affordability** of housings. This is confirmed in the downsizing trend observed both in UK and the USA.

However, houses need to be **flexible**: the basic model of a house have to be built for a nuclear family, but with the ability to be expanded as a family is essential. A study by the RIBA in the 1970´s promoted the concept of having long life buildings with low energy usage and loose fitting (flexible). The design briefs of the future should push the need for future expansion and adaptability much further up the list of priorities so conversations about embodied energy in buildings and the carbon footprint become irrelevant as buildings will be in a permanent state of evolution and use.

Technology must be an essential part of this flexibility and allow controlling the house interaction with the environment.

The increased attention to the environment has made **sustainable** design of housing a mandatory requirement for the future. Both USA and

UK markets have shown that this is already a must, and the sales of PV panels, heat pumps and small-scale wind turbines are rising throughout the globe.

Finally, in a continuously evolving society it is sure that changes will continue to occur. For this reason new housing developments will need to be **adaptable** to future society/city/family needs. In UK already large houses have been adapted to fit new family sizes, whereas the ones which cannot be adapted, or not durable enough, will need rebuild it remain unused, with a significantly higher environmental impact.

There is general acknowledgement across the industry that building standards need to increase the thermal performance of new buildings across all building types from offices to private homes. Architects, developers and private homeowners are beginning to address the environmental impact of new buildings on their environment while also minimizing the future running costs of the building through the addition of energy efficiency technologies.

This complete understanding of environmental design integrates environmentally sustainable principles from the very inception of the design to its legal obligations in construction and through careful specification of locally sourced environmentally sustainable materials.

With economic climates, property values and needs changing on a daily basis, the housing of the future must be able to adapt rapidly. They must be able to adapt to parameters such as the division of traditional families, global work opportunities that lead in increase in geographic movement and a change in living patterns, along with the global financial crisis, the elevated land and construction costs, energy efficiency, technology, etc.

Therefore the fundamental parameters that architects and designers need to take into consideration for the design of future houses are:

– flexibility as the capability of a house to evolve an change its functions following family and society needs;

– adaptability as the ability of a housing development to resist time and be reshaped in line with future requirements;

– affordability as the ability to remain good value from the moment of purchase till the end of its usable life;

– sustainability as the ability of the house to be in tune with the environment.

Conclusions

The way we design housing reflects directly the historical landscape that exists when they are conceived however architects and their architecture often outlive the economical situation and political climate they are born into.

In order to accommodate a diverse and rapidly changing household type, housing must be of a responsive nature, flexible and capable of adapting to the different needs of today's population and the unknown needs of the future, and all this while remaining affordable.

ENDNOTES:

[1] "A Revolution in Living." New York Times, June 3, 1878

[2] http://www.aia.org/practicing/AIAB086633

[3] Communities & Local Government, Survey of English Housing

[4] https://www.gov.uk/government/organisations/department-for-communities-and-local-government/about/statistics

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[10] http://www.NationMaster.com/graph/peo_ave_siz_of_hou-people-average-size-of-households.