

Rediscovering Dwelling

BARBARA WIDERA¹, MARTIN DESPANG²

¹Wroclaw University of Technology, Faculty of Architecture, Wroclaw, Poland

²University of Hawai'i Manoa, School of Architecture, Honolulu, HI USA

ABSTRACT: The focus of the paper is an investigation of a domestic dwelling as the most archetypical and essential human typology. Two house prototypes, set in totally diverse regional, climatic, cultural, financial and urban realities are being analyzed together in purpose to show the image of differences and challenges of responsible architectural design in two distant parts of the globe. While local and cultural factors are very important and strongly influence the project, the environmental and future oriented approach is crucial.

In both projects the quality of the building and the inhabitants life were of central importance. The same idea of "planet and people friendly house" in purpose to contribute to a carbon free world with the lowest possible fossil footprint has been developed in two entirely different locations. The comparison of results leads to some very interesting questions about the contemporary architecture, sustainability, local tradition etc.

Keywords: vernacular; innovation; thermal massing; bioclimatic architecture.

INTRODUCTION

The focus of the paper is an investigation of a domestic dwelling as the most archetypical and essential human typology. Two house prototypes, set in entirely diverse regional, climatic, cultural, financial and urban realities are being analyzed together in purpose to show the image of differences and challenges of responsible architectural design in two distant parts of the globe. Methodology based on "ethic behind the concept of sustainable development" proposed by Kristel de Myttenaere [1] has been used to assess these values of the architecture that go beyond the common tools, classifying the building as sustainable or not and accentuating its interaction with the environment [2]. This paper proposes to check whether the analyzed dwellings "help reducing the gap" between the natural and cultural environment of the suburb and the town [1]. Another point of interest is to check if/how the new residential architecture can improve the relations between the inhabitants i.e. "the people living in the building as well as neighbours, citizens, visitors or simply people" [1]. Finally the architects take the responsibility of the well balanced relation between the architecture, the unique values of the cultural heritage and the nature around. While local and cultural factors are very important and strongly influence both projects, the environmental and future oriented approach is crucial.

REINVENTING TRADITIONAL BAVARIAN DWELLING

The first house, situated in Oberhaching near Munich (Germany), is an example of reinterpretation of the (stereo)-typical vernacular Bavarian house. Designed by Despang Architekten for the two partners architects Cynthia Despang and Isabel Schlüpmann, and their

children, makes a combination of a family house, home office and a small community, where children learn some first social habits and recognize the environmental issue. Natural, contemporary look, best energy and climate performance as well as high user comfort result from innovative re-introduction of traditional materials, forms and solutions.

Although the architects admire vernacular Bavarian dwellings, they wanted the house to break out the popular design schedule, based on the timber decoration of the upper part, imitating the log house, and the plaster finishing on the ground floor, covering the brick or concrete structure (Fig. 1). The authors decided to adapt 21-st century technology of prefabricated insulated sandwich panels (Fig. 2).



Figure 1: The vernacular Bavarian home tradition of innovation (left) and its contemporary persiflage (right). Photography Martin Despang.

Concrete, used on the ground floor, provides the thermal mass of the building. The walls accumulate the heat in the winter and coolness in the summer to release it gradually, which helps saving energy while maintaining a high thermal comfort. The user comfort has been also improved by the location of all the essential space of the home office on the ground level.



Figure 2: Efficiency and effectiveness of prefab concrete.
Photography Cynthia Despang

The proposed plan allows to achieve flexible spaces in the whole building. Many solutions are multifunctional, e.g. the kitchenette on the ground floor can be used as a reception for the home office meeting-room. Since the ground floor features several different functions and the authors wanted to keep the plan maximally open, the inner space has been diversified by the surface texture. The potential of concrete as an artistic material has been fully demonstrated with the expressly apparent board and smooth form cast.

The tectonic layers of the house are clearly visible. Office on the ground floor is more official and colder with its concrete forms. Instead, the solid wood on the top floor creates cosy, warm look of more private space. Timber has been reintroduced on the upper part in form of prefabricated CLT (cross laminated timber) (Fig. 3). Such a usage of materials is an example of the contemporary interpretation of the local tradition.

The office space has been visually opened to the fields and meadows outside. Big, frame windows, without divisions offer the undisturbed view, let the daylight enter and enlighten interiors.



Figure 3: Strategic prefabricated stereotomic tactic.
Photography Cynthia Despang.

The sunlight, pleasant, healthy and cheap, is used during the whole day to reduce the electricity consumption. Bright, natural colors support the well balanced insolation in purpose to minimize the demand for the artificial light. All the furniture is lightweight and portable, so that the office interior can be easily rearranged. The connections between walls, roof, floors etc. are precisely fit to guarantee the humidity control, perfect indoor air quality and the highest visual standards. The free plan, together with the timber floor and the warm hue of concrete walls, create informal but elegant and professional atmosphere of the home office (Fig. 4).



Figure 4: Solarly and atmospherically charged space.
Photography Christian Schraner.

The second floor is used as a daytime area. Thermally modified timber rain screens over the windows on the top floor give this part of the house the higher level of privacy. The two architects have their work zone right above the meeting room so that both these places are well connected with an open staircase. The lounge with the kitchen, located in the central part of this floor, between the architectural studio and the children's room, has been designed as the open space as well (Fig. 5). That solution helps to avoid separate communication zones and therefore also unnecessary costs. The bathroom can be accessed from the common use area but the children can get there directly from their room. The space dedicated to the youngest inhabitants can be used for learning and playing. The room is connected with the lounge with the big horizontal, window. That makes the kids feel free but safe. They can play naturally without disturbing their working mums. Mothers on the other hand can easily control how their children are and that makes them feel calm, too. This prototype helped establishing the balance between the work and private life of the female architects and thus proposed the new standard for working parents in general.

THE SUSTAINABILITY OF THE OFFICEHOME

The authors called the new dwelling “the officehome Oberhaching”, a spin of the term “home office”, which conventionally means that people work at their homes [3]. In this case, the architects work here, but being both mothers, they use the building as a “home” in several ways. When their children come back from the kindergarten/preschool, they “live” here: they play, eat and spend a long part of the day. This is the reason why there is a kitchen on the top floor.



Figure 5: The kitchen with a window to children's room on the top floor. Photography: Christian Schranner.

Another contemporary idea of the house is the ability to respond to the natural dynamism of life, e.g. the relationships that happen and fail, businesses change and finally, the most obvious fact that the children grow up and leave their parents' homes. Through the simple installation of two separating walls, the ground and the top floor can be converted into separated units, accessed through the street front window doors, so that the officehome could be used in several combinations of “live” and “work” on the three levels (Fig. 6).

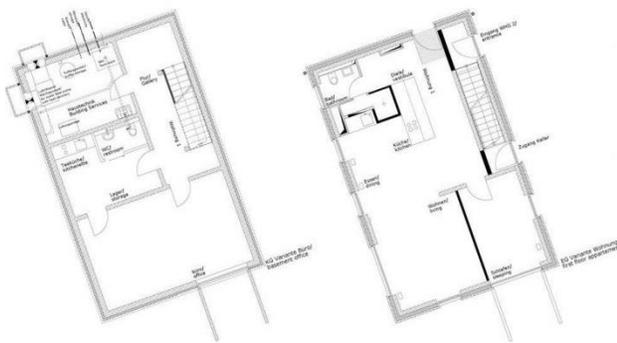


Figure 6: The floor plan adaptability: basement, 1-st floor, (black walls conversion from office to separate dwellings). Author: Cynthia Despang.

This way the “officehome” is dynamic and adaptable for various situations in the architects life (as workers and mothers), and therefore is also sustainable. Finally there is a potential subterranean working/living unit on the lowest floor.



Figure 7: The manifestation of the evolution of the tradition of Bavarian dwelling innovation. Photography Cynthia Despang.

The new dwelling has already proven its high comfort for several months. Both the mothers and the children appreciate the new life standard they gained. The officehome is well connected to a local transport network. Its location makes it easily accessible by bicycle or by car, within just a few minutes travel distance from the owners family house and the kindergarten.

Simultaneously the academic research platform in Hawaii [4] explored a creative reinterpretation of a traditional home, this time located not in the middle of Europe but right across the globe, on the island surrounded by the Pacific waters and known for its unspoiled nature.

21 CENTURY HAWAIIAN HOME

The second dwelling, located on the island of Oahu at Kapolei (Hawaii), is a brand new “neighbourhood unit”, dedicated to Native Hawaiians of 21-st century. It ties together small units of the private houses with semi-public area, that creates a contemporary, affordable, bioclimatic and environmentally focused facility.

The architectural team of “Archawaii” put a lot of effort into developing a physically and spiritually sensual home, built by local builders as a result of the collaborative, interdisciplinary design. Insightful studies on the local tradition have been undertaken in purpose to reconnect to some important virtues of the Native Hawaiian homebuilders. Their original structures (Fig. 8, left) were established in balance and harmony with science (bioclimatic) and arts (spiritually symbolic space and place based “architexture” as opposed to the Western “architecture”, based on more literal symbols and forms). Therefore the sustainable and bioclimatic

contemporary design lead to the fundamental idea of living in a balance with the elements.



Figure 8: The vernacular Hawaiian home tradition of innovation. Photography: Martin Despang in Bishop Museum Honolulu, Hawaii.

To provide the best connection to its location, the project of XXI century Hawaiian Home is set on rectangular plan, the most common in vernacular Hawaiian architecture. Another feature, very important for the residential structures of the archipelago, was an additive composition of groups of houses instead of building a single dwelling of a larger scale. As Brigham describes it: “(...) in Hawaii the hospitality of the people made their private home almost a caravansary. In some groups (...) an establishment of a chief or a well-to-do man consisted of several detached houses each for an especial use.” [5] (Fig. 8, right).

Observations and interviews with the local inhabitants revealed interesting data. Due to the mild climate conditions as well as the habits, shaped by their friendly attitude, the owners spend usually 70% of time outside and only 30% inside their homes. The further study showed that while each human activity was divided into more individual sections, such as kitchen, bedrooms, bathroom or storage, in the center there was a common space: a courtyard which formed a social hub.

Reflecting the research conclusions, the architects created the house with the central core that can be shared by the family and the visitors, surrounded by more private areas. The hall as the heart of the home has been accentuated by the higher roof that also allows better ventilation and gives the impression of open space (Fig 9). The individual customization is possible in numerous ways with sliding vertical louvered walls.



Figure 9: The H(awaiian) Home’s central hall by: Archawaii.

Within the private part of the house, the two levels of privacy have been distinguished. The less private areas: the kitchen and the dining room, the guest bathroom and the garage, are grouped on one side of the house and remain easily accessible by the guests. The more private, bedrooms and bathrooms, are situated on the other side, where the access is limited. Roller shades help regulating the balance between the openness (communication) and the privacy (nighttime shelter) (Fig 10).

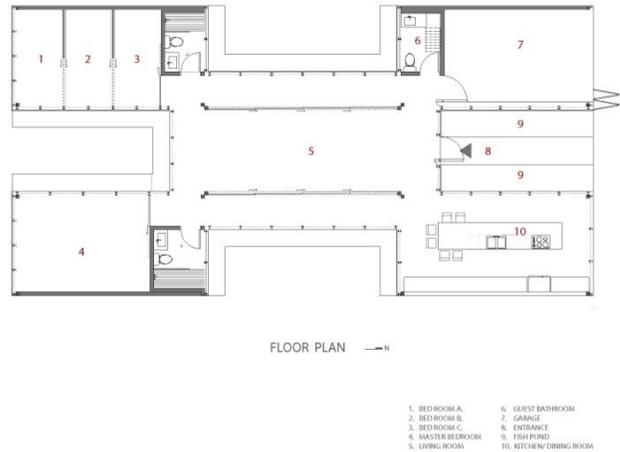


Figure 10: The layout of the H(awaiian) Home, four quarters around the central, common hall. Drawing: Archawaii.

The traditional equilibrium of community area and private space, so important in Hawaiian culture, has been disrupted last years. For example in a discussion about tall buildings in Hawaii, Kazi Ashraf notes that in Honolulu, when people walk down the street, they often cannot continue because the sidewalk disappears when buildings come down to the ground as garages [6]. Looking for a system that would restore the balance, the architects proposed the repetitive pattern, in which the houses form a neighborhood unit and create the high quality, semi-private and semi-collective green space between them (Fig. 11). The model is based on flexibility and well catered to the Hawaiians strong, multigenerational family. The layout in five quarters responds to that since each unit can be used separately or connectedly.

Human comfort based design has been developed through the local weather data analysis. To provide the best temperature and humidity conditions two aquaponic systems were added (Fig. 12). Their presence inside the dwelling helps establishing the balance between the nature and architecture and allows to implement the idea of living in harmony with the elements which is essential for the native Hawaiians.



Figure 11: The H(awaiian) Home's communicational community quality by Archawaii.

To the top of that the aquaponic system is designed to encourage individual clean and cheap food production. That self-sufficiency is not only sustainable but helps to deal with the high costs of living in the region, so popular among rich tourists.



Figure 12: The H(awaiian) Home's aquaponic entrance courtyard by Archawaii.

Digital energy modeling of natural air conditioning and cross ventilation using the wind flow through the building has been carried out. The design strategy has been confirmed by the detailed daylight analysis with the use of ECOTECT [7].

Similarly to the Bavarian dwelling, the Hawaiian house modular prototype can be adapted to the different lifestyles, needs and habits (Fig. 13).

RESEARCH FOR SUSTAINABLE MATERIALS FOR HAWAIIAN REGION

Critical research on the possibility of the application of sustainable, local materials concluded with the inference that while in many other regions of the world the timber structure would be one of the most logical choices, in Hawaii the potential of sustainable wood is very limited. As a result of the highest labor cost on the island and the lack of renewable tree plantations, the construction

timber is transported from the mainland which leads to unnecessary transport cost, termite treat and the increased pollution risk. In the region of Hawaii there is a necessity to develop renewable, fast growing tree plantations, being volcanic heat treated and borated with sea salt for termite protection. Still the architects decided that it would be impossible to produce enough wood in time to fulfill the needs of this particular project.

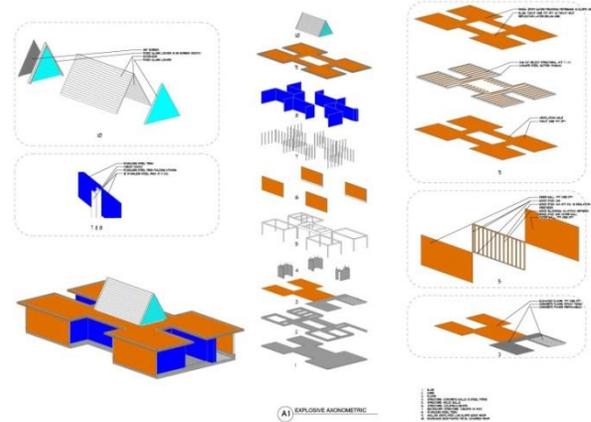


Figure 13: The H(awaiian) Home's modular adaptable kit of parts methodology by Archawaii.

To make the responsibility towards the environment the real fact and not just a slogan, the team decided to look for other materials. The analysis of the potential of concrete proved that the three of four necessary ingredients, i.e. water, sand and aggregates are local and only the cement has to be imported. Since the cement is the biggest CO₂ generator, the team suggested to substitute it with fly ash or, more innovatively, with the iron powder, a by-product of the steel industry.

The new iron-based composite, invented by David Stone from the University of Arizona is intended to be applied. The material is truly carbon negative. It will only harden when exposed to high concentrations of CO₂, which diffuses into the wet paste, reacts with the iron, and then becomes trapped as iron carbonate.

The cooperation with the concrete industry opened the possibility to (re-)enter the residential realm and resulted with the use of the "Twin T" systems for the floors and ceilings. With a suspended (non-structural) heat treated plywood sheathing, it creates a trade wind ventilated "cool roof", as appropriate in the region climate to keep the sun and the rain away. Concrete would also meet the point of structural integrity, superior to the existing wood frames, which have to be termite retreated about every decade. With the elimination of this necessity, the usage of pesticides can be avoided. Instead, for the trade winds operated breathable fenestration, heat treated wood may be used as a non-structural infill. This solution seems cheaper

and more attractive than the popular external blinds systems. The TMT jalousie would perfectly meet the requirements of security, privacy as well as dust and noise protection. The system is designed for permanent stack cooling effect and cross ventilation.

It is important to note that within the holistic, interdisciplinary design process, the unique learning environment has been provided. The program engaged a wide range of ecological and sustainable technologies, emerging housing trends, new construction processes and alternative (indigenous/innovated) materials.

CONCLUSIONS

In both presented projects the quality of the building and the inhabitants life were of central importance. The same idea of “planet and people friendly house” in purpose to contribute to a carbon free world with the lowest possible fossil footprint has been developed in two entirely different locations. The comparison of results leads to some very interesting questions about the contemporary architecture, sustainability, local tradition etc.

The same attitude towards architecture would vary, depending where the house is going to be situated. Dwellings, dedicated to Bavarian and to Hawaiian regions, are based on tradition but improved with the innovative approach. All the modifications result from the observations of changing lifestyles and needs of contemporary families in two distant part of the globe. The common feature of presented projects is the high level of flexibility, which appears an important demand of the two regions chosen for the study. The inhabitants appreciate the clear pattern that can be used many times without copying since the proposed solutions allow individualization of space without extra cost.

The poetry and pragmatism of ecological/green architecture, together with the budget and program constrains, are recognized as positive design generators. Optimal use of renewable energy sources, daylight, natural ventilation and sustainable materials have a key role in the design process. The choice of materials is based on the environmental analysis and provides the natural, contemporary appearance.

The small architectural firm proves that today it is not essential to produce great manifestos that were prevalent in the architecture of the 20th century. Nowadays it seems more important to design a valuable architecture that provides user comfort and emphasizes the beauty, but also respects the limits of the natural and cultural environment. At the same time, instead of seeking global golden rules, the architects should lean over the uniqueness of the region and the specific place where they design. A residential house makes an especially good example, because the contemporary user is not really interested in a mass-scale phenomena. His acceptance of the domicile derives rather from the fact

that the place is unique, chosen by himself, and provides comfortable and friendly environment for him and his family. Creating small, local communities of people inhabiting the architectural complexes is equally important in central Europe as in Hawaii since it leads to the significant improvement of relations between the inhabitants. The designer’s respect to the environment and the tradition of the place, skillfully intertwined with the contemporary aesthetics and technology, brings great results even in a small scale. The analyzed dwellings indeed help reducing the gap between the natural and cultural environment. This kind of design strategy is a contemporary reinterpretation of the idea of critical regionalism, developed by Kenneth Frampton [8].

The proposed approach to architecture helps to overcome one of the major problems of modern human civilization – the lack of time for the family and the imbalance between private and professional life. Solving such problems, also with the appropriately designed architecture, significantly affects the quality and comfort of life, which is an important element of sustainable development.

The difference between a single case study and a comparison made in a regional scale leads to another conclusion, that first of all we need to avoid generalization. Therefore, while forming principles of law and administrative rules, we have to analyze local, regional aspects together with the global environmental issue.

REFERENCES

1. De Myttenaere, K., (2011) Toward Sustainable Architecture, In *PLEA 2011 Architecture and Sustainable Development, Conference Proceedings of the 27-th International Conference on Passive and Low Energy Architecture*, Louvain-la-Neuve, Belgium, v. 1, p. 23.
2. European Commission, (1999), *Green Vitruvius: Principles and Practise of Sustainable Architectural Design*, James & James, Michigan.
3. <http://www.despanarchitekten.com> [16 April 2013].
4. Associate Professor Martin Despang and his University of Hawaii Manoa / School of Architecture students in Fall 2012, continued in Spring 2013 in collaboration with Assistant Professor Jason Selley.
5. Brigham, W. T., (1908), *The Ancient Hawaiian House, Memoirs of the Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History*, v. 2, no. 3, Bishop Museum Press, Harvard University, p. 187.
6. Ashraf, K. (2013) in: Sanburn, K. (2013) Tradewind towers, *Honolulu Weekly*, 23 April 2013, available at: <http://honoluluweekly.com/cover/2013/04/tradewind-towers/> [28 April 2013].
7. <http://usa.autodesk.com/ecotect-analysis> [14 April 2013].
8. Frampton, K. (1983), *Towards a Critical Regionalism: Six Points for an Architecture of Resistance*, in *The Anti-Aesthetic. Essays on Postmodern Culture*, Bay Press, Seattle.