A Small House Nation: Making Our Stuff Fit

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> "The problem of the house has not been posed… The architecture of today does not satisfy the necessary and sufficient conditions of the problem. That is because the problem has not been posed for architecture. There has been no useful war as was the case for the airplane." *[Le Corbusier. Toward An Architecture.]*

INTRODUCTION

Our homes inform the way we live. We spend years of our lives working to pay mortgages, electricity bills, cooling, heating and plumbing repair services. We stand at night in our kitchens, family and friends crammed into the smallest room in the house, laughing and talking. Depending on our surroundings we may spend hours mowing and maintaining a lawn and garden in warmer months. Our homes are the setting for holidays, parties and celebrations, love and loss, moments of both joy and melancholy.

As Americans, we have had no reason to scale down. Regarding Le Corbusier's problem of the house; (his comparison being World War I, which brought about the success of the airplane) we have yet to face a true housing crisis in America. With cheap gas and until recently a growing economy, our focus has been inward. What degree of financial and environmental meltdown do we need to reach before people will decide to change? In 1973, the average single family home in the United States measured 1400 square feet while today the average single family home is just over 2,200 square feet.

The phrase *bigger is better* has informed our spending and building habits as a nation and our Achilles heel may lie in the more than three and a half million square miles of land within U.S. borders. We've built not out of necessity but because land is both available and cheap. As the small fish in a big pond grows to match its environment, we have grown to reflect our vast landscape. And yet, what strikes me as problematic in today's ever-changing climate is our adherence to traditional modes of construction upon which we are building the vast majority of our nation's homes. Our concept of scale in a time of frugality seems out of touch, as is our treatment of sustainable building practices.

METHOD AND HISTORY

Following a brief history of the small house movement, this article addresses the essential functions of the house paying close attention to anthropometry and the ergonomics of space. Through both a written and graphic comparative analysis of four homes under 600 square feet and one cottage development in Washington state, I'll argue the case for small housing as a viable solution for sustainable domestic living, not only for individuals but for communities.

In the past five years the small house movement has grown from a group living relatively unnoticed to articles and projects on the front page of widely circulated design magazines and blogs. Sarah Susanka has sold several hundred thousand copies of her book *The Not So Big House*. Armed with a message of consolidation, she argues for reducing the traditional house size by one third and instead investing in interior finishes making for a better lifestyle. Jay Shafer, a pioneer of the tiny house

movement and owner of the Tumbleweed Tiny House Company, has made a living building and selling plans of houses that can be constructed on utility trailers and towed from place to place. Blogs like the *TinyhouseBlog* and *SmallHouseStyle* often publish daily, small housing projects, plans, and desirable products for the small house lifestyle.

With contemporary small housing becoming popular, companies like ModernShed and ModernCabana have specialized in building the backyard studio, office and guesthouse. These are not just sheds but highly tuned pre-fabricated structures often constructed on site in a long afternoon. Many Americans have latched on to the idea of a backyard retreat, whether it is a yoga studio, a home office, or a nicer place to store their prized gadget collection. The Small house is on the borderline of commodity. Like an adult play house, firms like ModernShed have capitalized on the need people have to retreat, often away from the things they daily surround themselves in their homes and places of work.

An interesting article, *The Elusive Small House Utopia*[1] written by Andrew Rice speaks about the housing peak from 2005 to 2007 and the sharp decline when the mortgage crisis unfolded. Marianne Cusato, known for her line of Katrina Cottages (featured through Lowe's) that range from 308 to 1800 square feet, was featured in the article as the designer of the Home for the New Economy. At 1700 square feet the home reflects the footprint of a home built 30 years ago and is a response to the 2500 square foot homes that were being built in the height of 2007.

What we learn from Rice' article is that in light of new urbanist design schemes, Americans are still reluctant to give up their space in favor of community buildings that offer the same things (exercise and home entertainment rooms) they have in their homes. Marketing strategies targeted at the individual have instilled in us the need for our own home theaters and exercise machines. Community buildings rid the home of these pricey items thus shedding square footage and promoting a way to build relationships with our neighbors.

The small house makes the statement for a minimal lifestyle. In a society where people have developed life-inhibiting disorders such as the hoarding of commercial items that devour their homes to a point of imminent physical danger, the small house stands as a beacon that rejects conspicuous consumption and embraces a streamlined lifestyle.

In a recent New Yorker[1] article entitled *Let's Get Small,* author Alec Wilkinson describes the trend of small housing in America. The Tiny House and its inhabitants are described within, naming three types of 'small housers': the young with ideas of tax and rent free living, the older who include both couples who have walked away from a larger house and a payment they could no longer afford as well as the couple with older children out of the house whose needs for space have decreased drastically. A fourth group looking to live with little environmental impact, often describe off the grid living. Of these constituencies, Rice indicates that many of the individuals seem to have the opinion of a housing conspiracy between banks and developers to build bigger houses than we need.

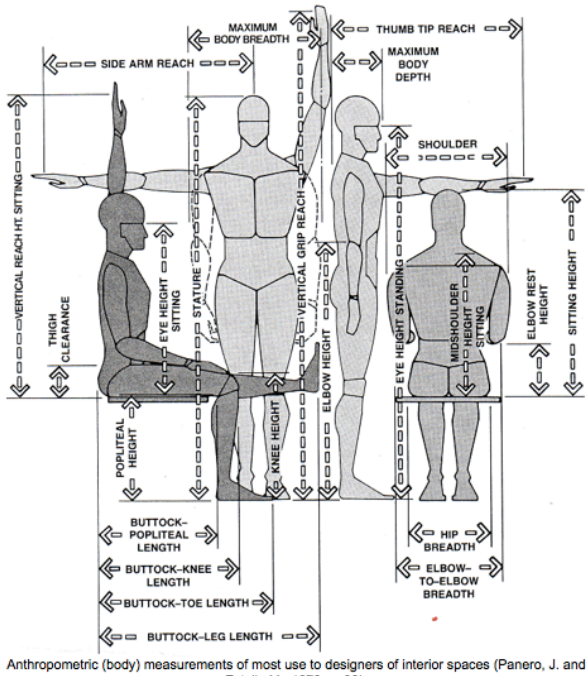
Figure 1. A Tiny House in transit.

Jay Shafer is featured along with his Tumbleweed Tiny House Company. A self labeled *claustrophile,* Shafer designs by the process of *subtraction*. With a background in art and painting, he was drawn to the idea of tiny housing out of skirting the building code, living in a trailer often deemed illegal by local coded enforcement. As is the case for many tiny house owners, the idea of living illegally is both thrilling and a way of challenging the system of housing in America. Rice's article confronts perceptions on the tiny house, and leaves those who both live in and support the movement contemplating issues of legality and civic responsibility.

Since the turn of the century a vast majority of people have viewed success as having great wealth and status, with a vital part of this lying in home ownership. Specifically, people aspired to a single family home complete with a white picket fence sited on an idyllic tree-lined suburban street. The idea of wealth for some has been transformed into a streamlined, mobile lifestyle based around the small house as people who own less are in a better position to travel at a moments notice, telecommute from relatively anywhere or simply reduce the remnants of a pre-digital age. Wealth for some is no longer associated with material possessions but the freedom to travel, seek adventure and do the things often associated with dreams.

ANTHROPOMETRICS AND ERGONOMICS

A truly integral strategy in the development of small housing is the careful implementation of anthropometry in each aspect of the design proposal. Reading Frank Ching's Architecture: *Form, Space and Order*[1]: "The dimensions and proportions of the human body affect the proportion of things we handle, the height and distance of things we try to reach, and the dimensions of the furnishings we use for sitting, working, eating and sleeping."



Anthropometric (body) measurements of most use to designers of interior spaces (Panero, J. and Zelnik, M., 1979, p. 30).

Figure 2. Anthropometrics: A study of the body.

There is an average dimension for most of these activities that we have been taught through either pedagogical experience or first person interaction. The small house becomes not just a structure but also a piece of furniture, a piece of useable art that we must navigate and be in tune with to function efficiently and effectively. The small must pay close attention to the human factor in its design approach. In this case, it means taking the client into great consideration with regard to his or her dimensions, habits, and idiosyncrasies within the home. The architect must be able to understand and implement systems that complement and cooperate with our physiological and psychological limits and demands.

Our perception of space and dimension can be affected in static and dynamic ways. As we lie on a couch reading, do the dimensions and form of the furniture we sit on comfort us? How does the feel of a door handle in our hand impact our perceptions of the space we enter? Has the architect made an effort to reflect the dimensions of our body and its relation to volume within time and space? These questions and more are what we need to ask and demand of the architects and designers responsible for the environments in which we live.

There is no room in small housing for the careless appropriation of space. Flexible and self-sufficient space is a requirement in achieving a cohesive whole. The mastering of these techniques allows the architect to be equipped with the tools necessary to execute a marvelous work of functional design and art. The success of the aforementioned examples are just this; a flexible and self-sufficient space that adapts to the task at hand, and blends the zones of cooking, recreation, bathing and washing, and sleeping and dressing into a cohesive whole.

FIVE CASE STUDIES

The Micro Compact House by Richard Horden, Minihome Solo by Sustain design studio and the Joshua Tree unit by Hangar Design group all accommodate a multitude of sites and users. The Nana Han home by Shuko Maejima in my belief contrasts the other three with a program both specific to site and occupant, while the Cottage Company's Chico Beach Cottages, utilizing new code fit seven homes ranging from 1470 – 1750 square feet on a little more than one acre.

The home has five main responsibilities: to provide a place for food preparation, a space for recreation, a space for dining, a space for bathing and washing and a space for sleeping and dressing. Of these spaces, in a large home there are usually duplicates, for example a five-person house usually consists of three to four bedrooms, a family room, a kitchen, dining room, a living room and den and quite often multiple bathrooms.

The small house must meet all of these needs yet in a more compact footprint. It must meet the demands of a larger than life lifestyle yet with more creativity and efficiency, often combining spaces into dual-purpose zones. Consider a traditional home of two parents and three children. There are times in the life of the house where space requirements are at a maximum and in both early and later stages of life at a minimum. (ie. Newly married couples and couples with students away at college or with families of their own) The large house sits with rooms empty when children move away while the small house has the ability to grow, to shrink and to adapt.

The Micro Compact House is the smallest of all structures and in many ways it is the most complete. Billed as a "modern machine for living" it embraces the digital age and modernity with great exactitude. In a publication released by the Museum of Modern Art titled Home Delivery: *Fabricating the Modern Dwelling*[4] we read:

> "The project is intended as a modern *machine for living*, "modern" specifically referring to the absolute extraction of domestic vestiges of a pre-digital age such as books and personal papers as well as to the rejection of the collection of clothing, appliances, and other personal belongings beyond the absolutely essential."

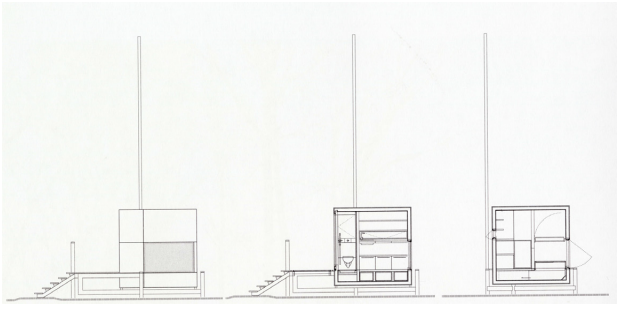


Figure 3. MCH: Section & Elevation

A central corridor that serves all circulation functions in the MCH divides the floor plan. Reminiscent of a ship's cabin or an airplane bathroom, the unit is tight but appears adequate for one to two people. The unit is separated by functions one might label work versus relaxation. Three large windows let plenty of light into the micro compact home, making the need for LED lighting only necessary on darker days and in the evening.

While complete for a single person, the MCH could be configured in a multi-unit arrangement to meet the needs of a larger family. Linking units both horizontally and vertically, the possibilities of more bedrooms and bathrooms along with areas for recreation are endless. The home has the capacity to shrink and grow with the family's position in life, adding or subtracting units as necessary. On a personal note, in 2008 I had the chance to visit MOMA's exhibit on the prefabricated house (*Home Delivery: Prefabricating the Modern Dwelling. 7.20.08 – 10.20.08*) While the MCH was well made, at 6'-4" I felt quite cramped, considering that my arm span is about eighteen inches shy of the house's width. I don't recall if my shoulders touched both the kitchen cabinets and the lofted bed, but I think I would have found it hard to get dressed in the morning. This was a wakeup for me in addressing dimensions of the human body, learning that the compact though intricate and well designed had limitations from its own design.

In at 270sqf, the MiniHome Solo by Sustain Design Studio[5] is an update to the traditional and often overlooked trailer home. Modern aesthetics and sustainable materials aid in a drastic transformation of a prefabricated icon. Passive heating and cooling strategies along with high performance insulation make the MiniHome an efficient structure requiring little energy for heating and cooling; while off-the-grid options are available for remote living such as a 400-watt wind turbine and a solar panel installation on the multi level roof and awning. A central corridor defines the space separating living demands. A sleeping loft above the kitchen area helps to compress the space, making dining and relaxation feel light and airy as the ceiling reaches its full height. The roof of the sleeping loft slopes upward providing ample head room which lends a spacious feeling for both sleeping and resting. The home, which stands on its own, could fit into a community of homes much like a traditional trailer

park community and/or be stacked to provide medium-density development. Compared to the MCH, the MiniHome Solo has ample room but lacks the refinement in both engineering and design.

Quite similar to the MiniHome by Sustain Design Group we find the Joshua Tree Mobile Unit from Hangar Design Group[6]. At roughly 36sqm [387.5 sqf], a traditional shape makes the home accessible to many people. Skylights provide a generous amount of natural light and ventilation as the space is divided into two bedrooms, two bathrooms, storage, a kitchen, dining and living room along a central circulation corridor. Joshua tree is such that the layout can be rearranged to suit the tastes and needs of each user. The gabled roof provides liberal headroom adding height and interest to a very orthogonal space.

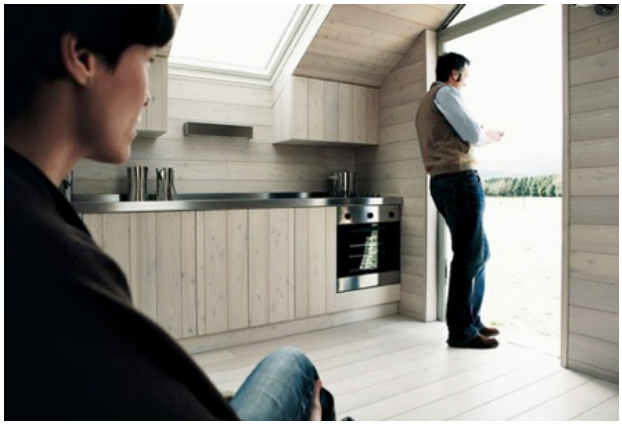


Figure 4. Joshua Tree: Interior view.

Hangar Design Group, has provided photographs of the house in secluded locations, its interior left bare of personal items while its inhabitants gaze out to the meadow at their doorstep. Their website mentions the Joshua Tree is designed with a sophisticated and demanding clientele in mind. While the MiniHome Solo uses stock furniture and case goods the Joshua Tree unit appears well defined and custom built. Interior finishes and fixtures complement the aesthetic of the home, while serving the user in a way that comforts and meets ergonomic demands.

Unlike our previous examples, the Nana Han house by architect Shuko Maejima responds to a very distinct program requirement: a motorcycle and its rider. Nana-Han is a term used in Japan to describe the size of a motorcycle engine. (Nana meaning seven and Han meaning half, translating to a motorcycle with a 750cc engine.) A tsubo is a Japanese form of measurement roughly thirty-five and one half square feet. Maejima uses both references in creating his 7.5 tsubo two story house with lot restrictions and a program dictated by an owner's love for motorcycles and their need to incorporate a space for their prized possession in their home.

This design contrasts the western case studies in a number of ways, but most importantly in scale. In the summer of 2007 I visited Kyoto, Tokyo and Nagoya, Japan on a design trip with my undergraduate university. As a tall American I was out of place, and my personal space was continually challenged as I adapted to slightly smaller dimensions and more compact living arrangements. The small house has the ability with proper design to adjust to the height and size of its occupant. As an outsider in Japan, I found myself quickly aware of the different design standards of a country I'd never been to.

The home, which is both elegant and simple in form, is intended for one to two occupants. The ground floor serves as both entry and garage with a large sliding door providing entry for both resident and machine. Plumbing fixtures also share the ground floor as toilet, shower and sink ride one wall in a galley style bathroom. The second floor combines living, sleeping and food preparation in one open space. An outdoor terrace accessible from the large kitchen and living room windows provides an interior court not visible from the street. Here we see an integration of both indoor and outdoor space, as a roof terrace becomes an additional outlet for everyday living.

The Cottage Company is an interesting comparison against four homes all under 600 square feet. Formed after a 1995 code provision, the city of Langley, WA adopted the Cottage Housing Development code where they recognized that a 1 to 2 bedroom home with less than 975 square feet should be treated differently from the typical 2,000 to 3,000 square foot home. The code stipulates that no more than half of the homes in a cottage development can be more than 800 SF, and the other half 700 SF, on the first floor with a total of 975 SF on two floors. What this meant for the town was that in the space two to three large homes could typically be erected, between four and twelve could serve the same space. Since 1995 the cities of Shoreline and Red-

mond, Washington have adopted similar code provisions. The forward thinking vision behind the zoning board of Langley, WA was instrumental in providing a ingenious way to meet the needs of residents not requiring or wanting the space of a large home, yet in the so called 'pocket neighborhoods' amongst single-family development.

Figure 5. Cottage Company: Chico Beach Site Plan

The Cottage Company has completed 8 pocket neighborhoods since 1995 in and around Langley, Shoreline and Redmond, WA. Their aim is to integrate houses in the natural environment as well as existing communities. These small homes enable people in various life stages to take an active role in a community. Single parents can benefit from the support of a community and not worry about the upkeep of such a large house, while both young and old couples can start and end their lives surrounded by people interested in community and the environment. Similar to New Urbanism the pocket neighborhood offers a community gathering space with central lawns and gardens.

Looking back to the previous housing examples, one can see how all four can be adapted for a project much like the pocket neighborhoods of Langley, WA, perhaps with even more density. Their new development, Chico Beach Cottages reflect the size of the Home for the New Economy by Marianne Cusato, featured in Andrew Rice's article, *The Elusive Small House Utopia*. In the their two bedroom home, living, dining and kitchen share an open plan with a first floor master suite, while a second bedroom and a study occupy the upper story. There has been a conscious move to merge functions, thereby reducing space and circulation needed for all three, and ultimately square footage.

Even with a larger floor plan, the Chico Beach Cottages are no different than the MCH, which takes ergonomics into great consideration. Moreover, the user must be addressed. As the company aims to attract both young and old couples, each user has different needs and demands for how the space should function.

CONCLUSION

Shuko Maejima's Nana Han house lies in a community where small housing is both the norm and cultural moray; the homes in America are big because we have the space. It would be fair to imagine that housing would be much different if our country, like Japan, were smaller than California and had three and a half times the number of people within its borders. However, simply because we have the space does not mean we need to fill it with large homes; thus the case for small housing.

A small house is economic on a multitude of levels. A reduction in house size places less demand on the energy grid, or in a remote situation a small house has an advantage over a traditional home of 2200sf in becoming self-sufficient in energy production with the use of renewable technology. The material demand decreases significantly, as does waste created in the construction of reduced home size. In the case studies represented in this article, all have the ability of maintaining a year-round occupant, and while the intent in some lies in temporary living strategies, all contain the necessary functions addressed in a reasonable way to be inhabited twelve months of the year.

Serving a number of demographics with the ability to be executed in a number of configurations from remote to the ultra dense, the small house holds a critical foothold in urban, rural and suburban living conditions. Just as I felt personally cramped in Horden's MCH, architects and designers need to pay close attention to the body in space, consciously considering ergonomics and anthropometry. Small housing should be considered as a serious social and economical option for many living in and experiencing a true hyper-digital age in a penny-conscious economy.

ENDNOTES

1 Rice, Andrew. "The Elusive Small House Utopia" New York Times Magazine. New York, NY. 2010. P 58-61.
2 Wilkinson, Alec. "LET'S GET SMALL." New Yorker; New York, NY.07.25.2011. Vol. 87 Issue 21, p28-34.
3 Ching, Francis D.K.. "Architecture: Form, Space, and Order" John Wiley & Sons, Inc.: New York, NY. 1996. p 118-130, 185-185, 310-312.
4 Bergdoll, Barry. Christensen, Peter. "Home Delivery: Fabricating the Modern Dwelling" The Museum of Modern Art: New York, NY. 2008. p 190-195.
5 Zeiger, Mimi. "Tiny Houses" Rizzoli International Publications : New York, NY. 2009. p 131-135, 188-191.
6 Benitez, Cristina Paredes. Vidiella, Alex Sanchez. "Small Eco Houses: Living Green in Style" Universe Publishing : New York, NY. 2010. p 25-33.

FIGURES

1 A Tiny House in Transit. Jay Shafer. [www.tumbleweedhouses.com]

2 Anthropometrics: A study of the body. Image obtained from K-state website: [www.k-state.edu/udlearnsite/Lesson4.htm]

3 Micro Compact Home: Section and Elevations. Bergdoll, Barry. Christensen, Peter. "Home Delivery: Fabricating the Modern Dwelling" The Museum of Modern Art: New York, NY. 2008. p 190-195.

4 Joshua Tree Unit: Interior view. Image obtained from Design-Milk Website: [design-milk.com/joshua-tree-by-hangar-design-group/]

5 Cottage Company: Chico Beach Cottage Site. Image obtained from Cottage Company Website: [www.cottagecompany.com/Communities/Chico-Beach-Cottages/Chico-Beach-Cottages-Site-Plan.aspx]