Architecture
on the move

TU Delft
Explore Lab
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Research Plan

What are the solutions applied to thhe
design of mobile homes that contribute
to creating user centered sapces?

RESEARCH INTRODUCTION.

In the ever-evolving world of architecture, the concept of "mobility" takes the stage by reshaping the way we perceive and interact with the built environment. As architects engage with the idea that "everything is moving," a transformative shift occurs in our understanding of space, materials, and the relationship between structures and their surroundings. This dynamic field of study, known as mobile architecture, explores structures that adapt, react, and seamlessly integrate with their environments, creating a new paradigm in architectural design.

"Creating space is the main action for an architect. It can be done with sturdy material in a fixed situation but also in another way. A more adventurous approach is to have the material move or move the whole building."

- Edward Bohtlingk
(Essay: Everything Is Moving)[1]

As a way to introduce the topic, it's vital to recognize that mobile architecture goes beyond the mere act of creating space that isn't bound by a fixed location. It represents a profound countercultural response, challenging established norms, work habits, and our tendencies toward excessive consumption.

Architect Jennifer Siegal, in her book "the art of mobile architecture", explores this exact reality, where architecture, especially in the housing sector, is losing its personal value. The real estate market, manifested by a growing demand for high-interest properties, has cultivated a trend where individuals are driven by the possibility of profit, easily accessible by selling and buying new houses every few years. Meaning that the value of each property has a closer relationship with the ground it sits on rather than the static house placed on it.

This evolving perspective questions if in these cases a portable home becomes more permanent than a static one since it's looked at not only as an asset but as something that has true personal value to the consumer. [2]

For much of human history, our survival was intrinsically tied to the need for constant movement. However, as we shift our focus from sheer survival to a pursuit of more comfortable living, we are confronted with the question of whether the nomadic way of life still holds relevance in the modern world. This underscores the significance of viewing mobile architecture not merely in its current state, favored by the modern nomad. It is equally crucial to examine a comprehensive analysis of its evolutionary journey. Tracing its roots back to the traditional nomadic structures of ancient tribes and extending through significant milestones like the Industrial Revolution and space expeditions. These historical times collectively paved the way for the contemporary concept of mobile architecture.

Yet, the heart of this research focuses on the practical aspects of mobile buildings, particularly from an architect's perspective. It addresses the complexities of designing for mobile living. Over the years, technology permitted the development of alternatives that honor perfectly the pioneer concepts of the first men. How these portable solutions create smart and accessible layouts in tiny living spaces, requiring architecture to be interpreted in a more considered way, is something worth exploring, as many of the ideas used in these designs are helpful when applied on any architectural scale.

[Figure 1] Collage of Spirit Shelter

RELEVANCE.

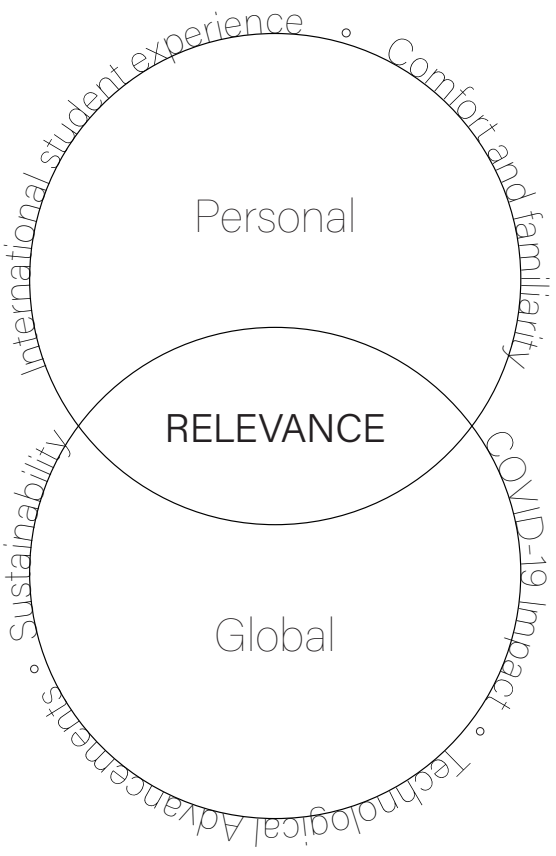
Mobile architecture holds significant relevance in today's rapidly evolving world, having the potential to address both personal and global needs.

On a broader scale, the relevance of mobility is increasingly evident in our dynamic world. The COVID-19 pandemic has highlighted the critical importance of not taking freedom and mobility for granted, especially concerning work, and living arrangements. Advancements in technology are reshaping the traditional workplace, transitioning it towards remote, home-based settings, which may constrain opportunities to escape the confines of a fixed space.

The Digital Age and the rapid advancements in Technology has blurred the lines between work and home, demanding flexible architecture that can adapt to changing needs.

The significance of mobile architecture extends to its sustainable solutions for contemporary spatial challenges. On one hand, it embodies a forward-thinking, environmentally conscious approach that offers a lighter construction that present lower carbon footprints and disrupt less biodiversity on site compared to permanent construction. Simultaneously, it acts as a testing ground for innovative ideas, aiming to shape the future of permanent building practices. This approach prioritizes adaptability, functionality, and efficiency in material usage, laying the groundwork for the construction methods of tomorrow. [3]

On a personal level, for international students, mobile dwellings represent a desire for a sense of familiarity in an unfamiliar environment. The adaptability of mobile architecture meets the needs of those who experience multiple changes of address in relatively short time frames, reflecting the practical challenges of student life.



[Figure 2] Venn Diagram Relevance Duality

RESEARCH AIMS.

This research is a multifaceted exploration, consisting of two domains: historical research and a practical design approach research, each driven by unique and complementary objectives.

The historical research component is dedicated to:

Understanding Evolution: It seeks to trace the historical trajectory of mobile architecture, unraveling its development over time, and identifying pivotal milestones in its evolution.

Challenges and Failures: This part of the research explores the challenges that mobile architecture confronted on its journey towards becoming more functional. It also seeks to shine a spotlight on instances of failure among portable buildings, dissecting the reasons behind these shortcomings.

Finding Design Connections: Aims to explore potential connections between the design principles of ancient nomadic tribes' and the contemporary models we see today.

But the most important discovery in the historical research is that there is a moment in time when mobile architecture loses its mobility. Trying to imitate static buildings, masking materials, and designing to resemble the conventional. Making portable buildings to be associated with the lack of resources.

Notably, Robert Kronenburg, a prominent figure in mobile architecture and the Head Chair of Architecture at Liverpool University in the UK, emphasizes that while portable buildings shouldn't be approached in the same way as fixed ones, they must still be able to provide the necessary levels of comfort and well-being. [4] This perspective underlines a fundamental truth across all architectural endeavors: the design of space profoundly influences how people feel.

This realization opens the door to the central focus of the research: *Discovering the Solutions used when designing mobile homes, that contribute the creation of user centered spaces.*

Defining what being mobile means: While our first impression of mobile homes typically centers around their ability to relocate from one place to another, the true fascination emerges from the inherent mobility deeply integrated into their structure, particularly their moving components.

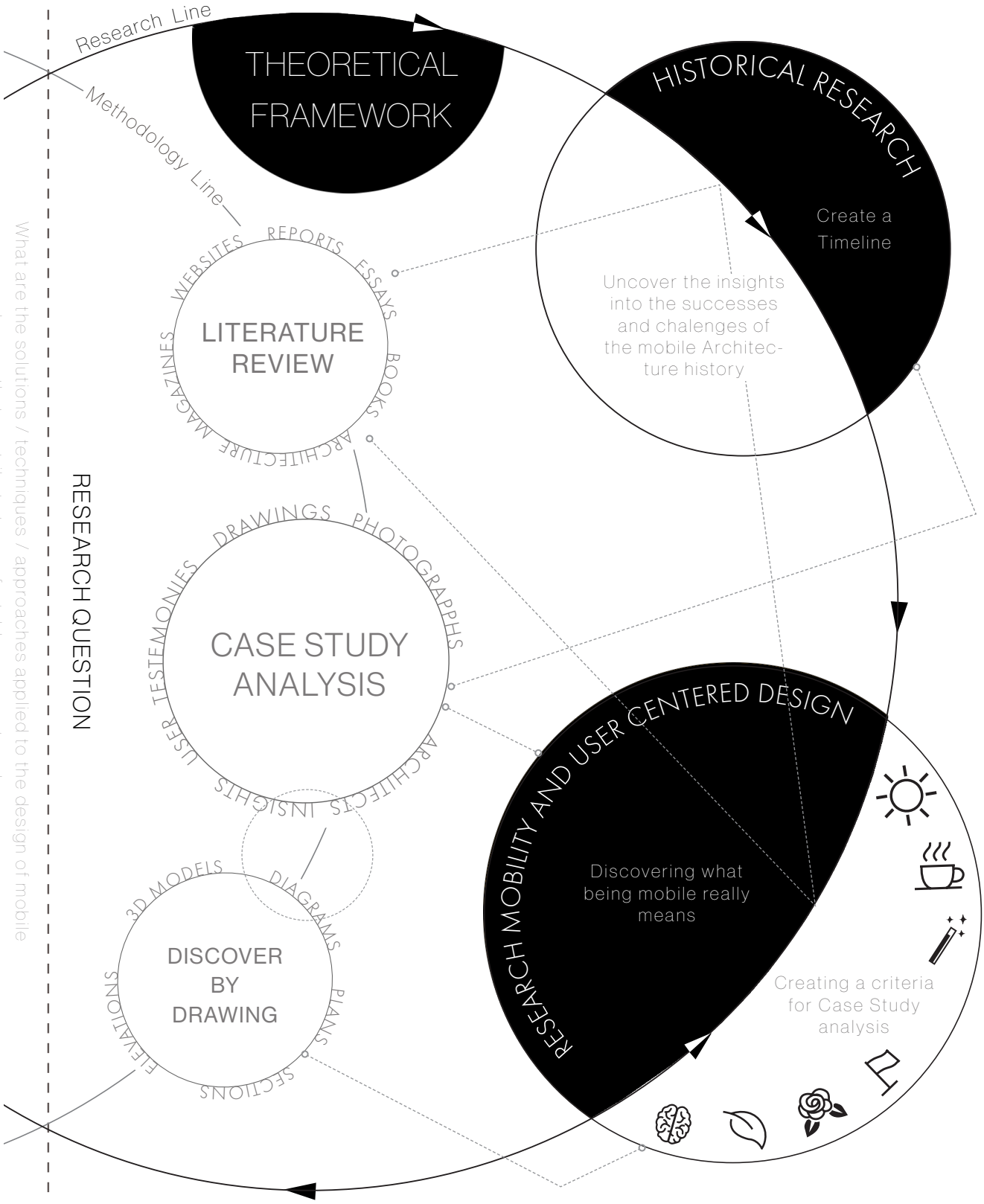
Exploring User-Centered Design in Mobile Homes: Seeks to investigate the ways in which mobile home designs can be tailored to prioritize the comfort of the occupants. This research aims to uncover strategies that facilitate creation of mobile homes that convey minimal space with functional design and sustainable solutions.

1. Seonwook, K., & Pyo, M. Y. (2012). Mobile Architecture.
2. Siegal, J., Codrescu, A., & Kronenburg, R. (2002). Mobile : the art of portable architecture.
3. Slavid, R. (2009). Micro: Very Small Buildings. Laurence King Publishing.
4. Kronenburg, R. (2008b). Portable architecture: Design and Technology. Springer Science & Business Media.

FASCINATION

ARCHITECTURE ON THE MOVE

[Figure 3] Research Diagram



CONCLUSIONS + RESULTS = KNOWLEDGE

METHODOLOGY.

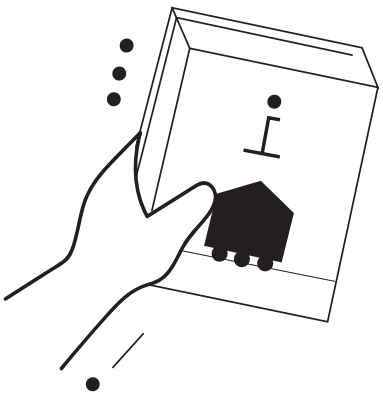
The research begins with a fundamental fascination in mobile architecture. However, as the research question takes shape, the need to articulate and clarify the research goals becomes evident. At its core, the primary objective is to gain knowledge — In simple words achieve a good overview of what is important to design a functional and user focused mobile home.

It seemed imperative that the research methodology involves a meticulous ***analysis of Literature*** that focuses on the work of architects who share a similar fascination. These architects perceive mobile architecture as a vehicle for innovation. Therefore, this method was crucial in acquiring insights from fellow architects who share a similar perspective about the mobile world. These individuals have not only designed portable buildings but have also produced written works that guide us through historical journeys. Hence, this method proved exceptionally valuable in achieving a deeper understanding of the evolution of mobile architecture.

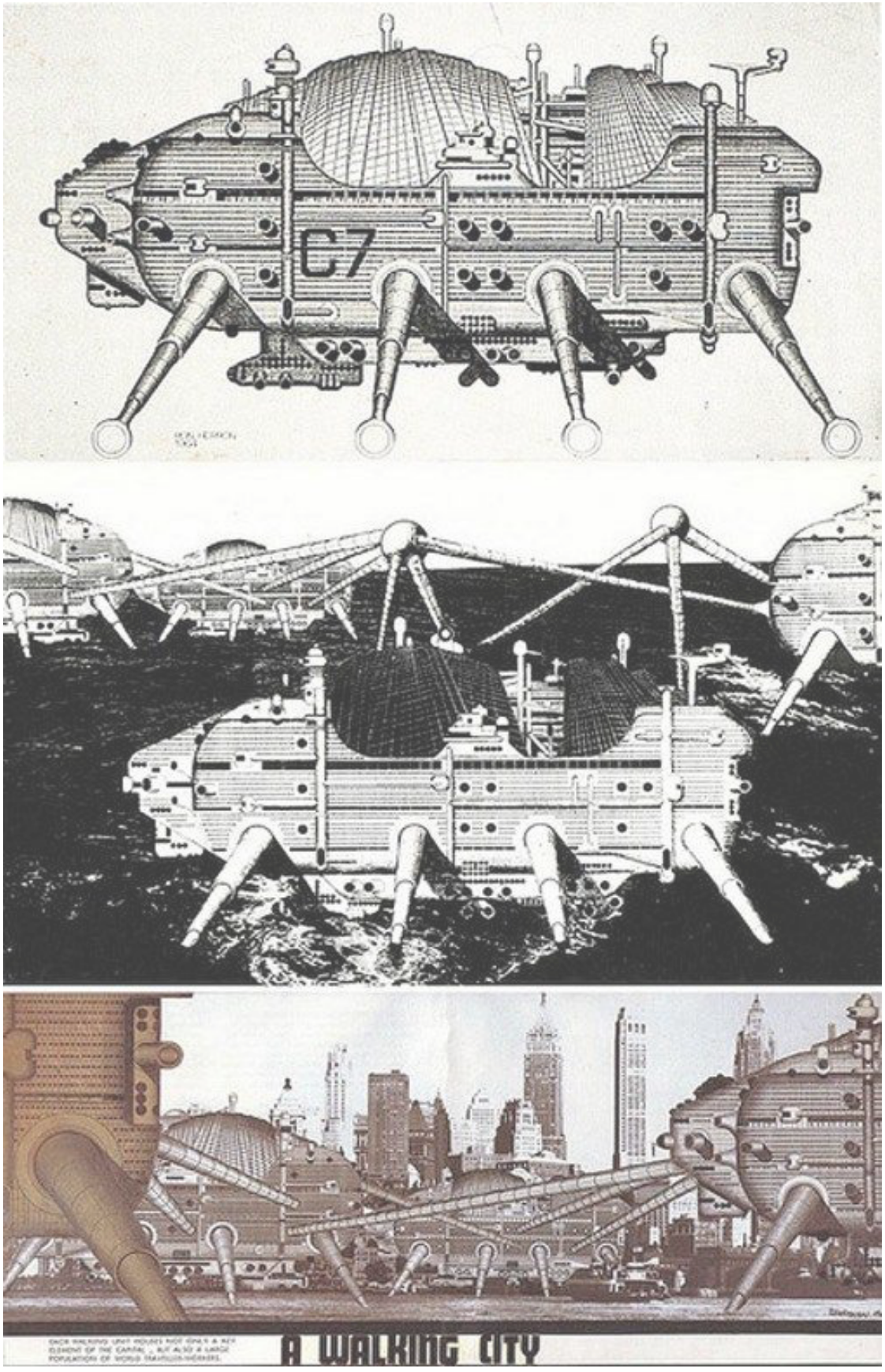
Although a comprehensive analysis of literature was important to build the context and theoretical portion of this research, The main method employed involves the ***analysis of real-world case studies***. The criteria built to analyze the chosen case studies is shaped by the combined influences of historical research and the principles of mobility / user-centered design, which are derivative of the first method employed in this research, the literature review.

While the foundation of the general criteria has been firmly established, this leads to the introduction of another method, known as ***"drawing discovery"***. Although the case studies have been meticulously chosen, and their accompanying literature and architectural drawings have been subject to analysis, it became apparent that these approaches had their limitations. The true, informative insights appeared much clearly after the creation of detail drawings of the case studies, meaning that tracing original plans and developing detailed 3D models shows to be the most effective way to reach the best perceptions on each project.

This will then lead to the development of diagrams that should explain in a more clear and visual matter how the mobility integrated in these buildings directly relate to improving the living experience of the user in that space.



[Figure 4] The Walking City - Archigram



LITERATURE REVIEW.

The research encompasses various types of literature, each serving distinct purposes in the study. Here's an overview of the sources that have been instrumental in different phases of the project:

Historical Analysis: In the pursuit of historical insights, I turned to books authored by renowned architects like Jennifer Siegal and Robert Kronenburg. Their work stand out as they underline the immense potential of mobile architecture in shaping the future. These authors provide comprehensive historical overviews, shedding light on the origins of portable living approaches and the driving forces behind its continuous evolution. The research also encompassed an analysis of literature and books authored by influential architectural groups like Archigram and The Metabolistas, that advocated for movement as a pivotal force within the architectural realm. [5, 6, 7, 8, 9, 10]

The Interplay Between Mobility and User-Centered Design: Various sources have been instrumental in shaping the fundamental criteria for assessing the case studies. Specifically, "Happy by Design" and "The Architecture of Happiness" offer a comprehensive framework that combines practical and theoretical principles, defining the essence of user-centered design in architecture. Furthermore, "The Construction and Design Manual for Mobile Architecture" enhances this perspective by featuring enlightening essays that shed light on the significance and implications of mobility within the spectrum of user-centered design. [11, 12, 13, 14]

Creating the Case Study Spectrum: For the selection of case studies, I researched mobile architecture books and digital architecture magazines. These sources not only presented examples of portable buildings but also highlighted the unique qualities of these structures. [15, 16, 17, 18, 19]

5. Kronenburg, R. H. (2002). Houses in motion: The Genesis, History and Development of the Portable Building. Academy Press.
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CASE STUDY SELECTION.

The analysis of case studies serves as a pivotal tool to investigate the practical dimension of the topic. The selection process for these case studies follows a structured approach, with several key standards in mind.

1. Curiosity-Driven Selection: After analyzing numerous sources featuring hundreds of mobile homes, a selection process was carried out, resulting in the choice of approximately 100 cases. This selections were based solely on their capacity to exhibit innovative responses to design principles, provoking curiosity about their architectural design even without prior analysis.

2. Paper Trail Selection: The second step in refining the selection process significantly reduces the number candidates. This step involves evaluating the amount of technical information available on each case study. Specifically, narrowing down the choices to only those that provide an adequate number of technical drawings and images, ensuring that there are necessary resources to conduct a thorough analysis.

3. Link to history selection: This entailed opting for examples that exhibit a distinct connection to historical precedents in their methods or styles, highlighting the enduring influence of past mobile innovations, and directly relating to the initial part of this research, the historical timeline.

4. Transportation & Mobility: It was essential to discover the transportation methods employed for each building and ensure that the selected case studies represent a diverse range of transportation options. This encompassed buildings that can be moved by foot, bicycle, car, truck, and even helicopter. But because this research is not only about exploring how the buildings move from A to B. The focus extends to how the structural components of the building can be manipulated to expand space, enhance user comfort, and even challenge the conventional boundaries between indoor and outdoor environments.

Following the completion of the selection stages, a pool of potential case studies for analysis has been identified, comprising approximately 20 candidates. The primary objective is to analyze a maximum of 10 case studies in the main research paper. However, the definitive selection will occur during the drawing analysis stage. This stage, as mentioned earlier, serves as the pivotal method for unveiling the unique qualities inherent in each case study.

1. **100** case studies

Curiosity

2. **76** case studies

Paper Trail

3. **53** case studies

History link

4. **17** case studies

Mobility & Transport

goal is **10** case studies

Case Studies

[Figure 5] Collage of case studie

ANALYSIS CRITERIA Nº1

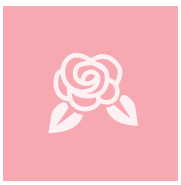
Defining the parameters of User Centered Design within the context of architectural spaces can be a complex task. In the book "Happy by Design" by architect Ben Channon, the concept of happiness within living spaces is simplified. Channon introduces general values that can be dissected into specific and concrete design approaches applicable to various architectural settings. After exploring Channon's work, it became evident that his approach could be adapted to this research. To make it more relevant, I customized these general values to better suit the case studies in question and the world of mobile architecture.

LIGHT : This fundamental explores the importance of natural daylight in architectural design, recognizing its impact on humans physiological systems that influence our mood, productivity, and overall well-being. To optimize natural light, architects can employ various strategies, including careful building orientation, accounting for external shadows and building shape, selecting appropriate window sizes, avoiding deep floor plans, incorporating high-level windows for light and privacy balance, and utilizing roof lights.

COMFORT : Being comfortable in our bodies is a commonly valued ideal. Comfort also promotes relaxation and a sense of safety. So in order to improve the user focused qualities, the design should focus on creating comfort in environments by using tactile materials, maintaining a comfortable room temperature, ensuring fresh air supply, and prioritizing comfort over aesthetics when needed.

NATURE : Spending time in nature has a significant positive impact on our well-being, reducing stress, enhancing memory, and boosting creativity and kindness. Many today are losing this connection due to home design. Architects should prioritize integrating nature inside, offering natural views, utilizing sustainable practices, and embracing a biophilic design approach to benefit our mental health.

PSYCHOLOGY : Our daily moods are influenced by various factors, some of which we're unaware of. However, many aspects of our lives, dictated by how others design or living spaces, also affect our psychology. This Item of psychology determines some of the hidden aspects of design that have a big impact on our mood, even though they go unnoticed by most, such as the importance of storage, designing with high ceilings, open plans, and the realization that bigger isn't always better in space design.

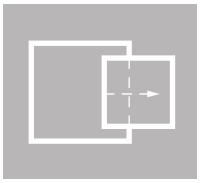


AESTHETICS : Sight is a crucial sense, and research confirms that visually appealing things and places increase happiness. The debate between prioritizing aesthetics or comfort in design is resolved through a user-centered approach that values both. While defining aesthetic design can be challenging due to personal taste, some rules, such as thoughtful color usage, avoiding visual monotony, appreciating simplicity, and achieving balanced proportions, lead to visually pleasing designs.

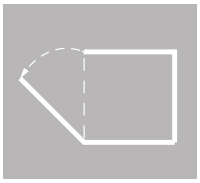
CONTROL : Psychological research indicates that perceived control enhances contentment, even when actual control remains unchanged. When designing any building, it's crucial to ensure users feel in control of their immediate environment. In mobile homes, this aspect is even more significant. Architects focus on providing users with control over their surroundings by creating adaptable spaces, diverse environments, privacy considerations, and, in mobile architecture, enabling off-grid living for users to place their homes anywhere.

ANALYSIS CRITERIA Nº2

It's crucial to grasp that when considering mobile architecture, our primary focus isn't solely on the building's ability to physically move from one location to another, thereby granting individuals greater freedom in choosing where to live. What truly captivates about these structures is not their mobility in the traditional sense, but rather how their design dynamically move, adapts within its various components to craft spaces that best cater to the users' needs. Hence, this analysis aims to examine the profound influence of mobility in these buildings when it comes to the improvement of foundational aspects centered around the user living: light, comfort, connection to nature, psychology, aesthetics, and control.

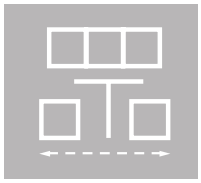


CENTRAL CORE EXTENTION

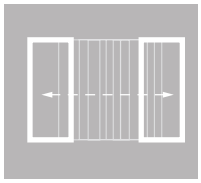


DYNAMIC OPENINGS

FOLDING STRUCTURE

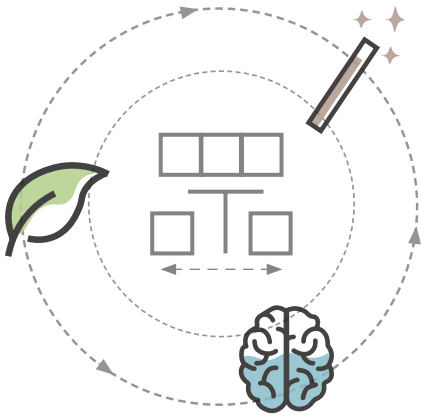


MOBILE FURNITURE



SHRINK/GROWING STRUCUTRE

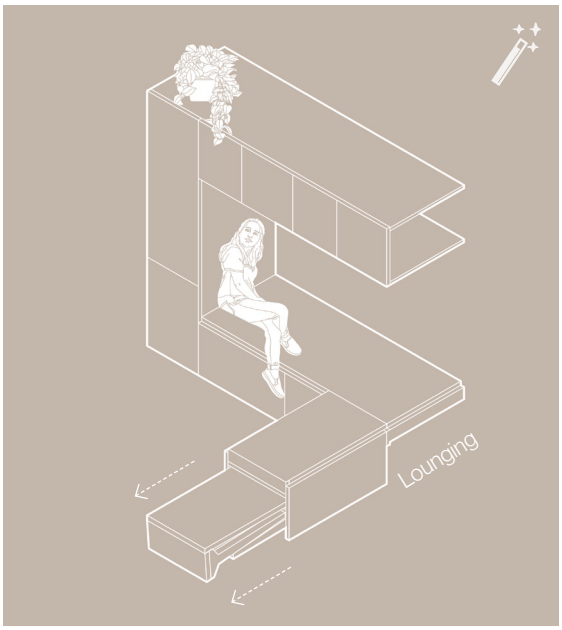
ANALYSIS EXAMPLE - TINY WALDEN.



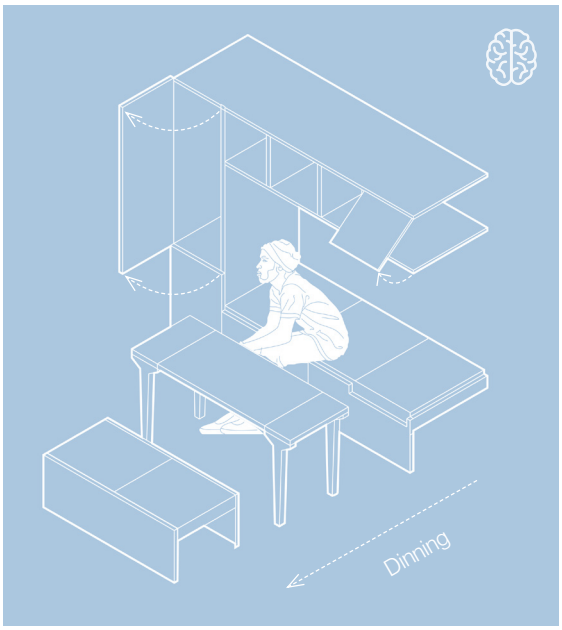
[Figure 6] Diagram interplay mobility and design

[Figure 7] Photograph of the Case Study "Tiny Walden Mobile", Interior Space

I've undertaken a detailed analysis of one of the case studies, The Tiny Walden, which serves as a pivotal illustration of how the intersection of mobility and user-centered design principles manifests in practical scenarios. In this specific case, we can discern how the concept of mobile furniture modules plays a pivotal role in affording users enhanced control over their living environment. These modules facilitate the creation of a diverse array of adaptable spaces within a confined area, thereby improving storage solutions and positively influencing the user's psychological well-being. Additionally, the versatility of these modules, designed to function both indoors and outdoors, dismantles the conventional boundaries separating architecture from the natural surroundings. This integration fosters a more profound connection between the user and the natural world.



[Figure 8] Tiny Walden Diagram 1 Mobile Furniture



[Figure 9] Tiny Walden Diagram 2 Mobile Furniture

[Figure 10] Photograph of the Case Study "Tiny Walden Mobile", Mobile furniture module being used outdoors

CONTENT PLAN.

CONCLUSION & REFLECTION.

In Conclusion, during this research into mobile architecture, I faced a fundamental decision: should I focus predominantly on the historical or the practical aspects of this field? Ultimately, I resolved to create a research plan that would encompass both dimensions. However, the heart of this study is a deep dive into the nuanced design considerations that define mobile buildings.

My personal connection to these subject stems from my own experiences of embracing a nomadic lifestyle. Leaving my home Country at the age of 18 to pursue an international education led me to reside in four different countries and move between seven distinct houses over the past seven years. As a student, I encountered the often-subpar living conditions offered in student housing, considering the exorbitant costs involved. Through this international ride, I've found myself drawn to the nomadic way of life, but I also long for a sense of familiarity that can travel with me, creating a "home away from home". What fascinates me further is how mobile architecture challenges architects to design spaces that are not only functional and sustainable but also contravene our era of rampant overconsumption.

The historical research component of this study has exposed me to a critical juncture where mobile architecture shifts from genuine mobility to imitating the static architectural paradigm. This realization has solidified my belief that the true essence of successful mobile architecture should be rooted in innovation, refraining from the constraints of traditional design principles.

At the core of this research lies an exploration of what success truly means in the world of mobile architecture. My aim is to uncover everything I can about designing mobile buildings that excel in both functionality, user comfort and sustainability. To achieve this, I embark on a meticulous analysis of carefully selected case studies, encompassing user driven designs, diverse architectural structures, and spectrum of different types of mobility.

[Figure 11] Port-A-Bach by Atelier

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