

Hawaii Housing Lab

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The state of Hawaii is facing a critical shortage of affordable housing. The Hawaii Public Housing Authority is in the unique position to contribute to solutions both through new mixed-use, economically-diverse, TOD-oriented projects and through redevelopment projects. This paper presents the design of a community engagement process developed to involve future residents in the early phases of the design process of future housing. A series of co-creation tools and a mobile research lab ask the community how they would design more walkable, sustainable, and equitable communities, neighborhoods, and homes across Hawaii.

STATE OF SUPERLATIVES

Hawaii is known around the world as a tourist destination and is beloved for its spectacular beaches, volcanic landscapes, and unique culture of aloha. This global adoration has resulted in a series of astounding realities.

Honolulu, the state capital, has the fourth-highest average construction rate in the world at \$196 sq/ft, only Oslo (\$251 sq/ft), San Francisco (\$212 sq/ft), and New York (\$207 sq/ft) are more expensive to build in.¹ Today, \$93,300 or less is considered "low income" for a family of four on Oahu² and it now takes 40 years to save for a down payment on a median-priced home on a median income in Honolulu, matching San Francisco as one of the most expensive markets in the country based on income.³ Not coincidentally, Hawaii has the highest per capita homelessness rate in the country, tied with New York City.⁴ Honolulu is also the fourth densest city in the US, with 11,548 people per square mile, and its 953,207 residents live in just 600.7 square miles.⁵

Geographic location, scarcity of land, astronomic construction costs, and speculative investment have led to an unattainable market. The need for affordable housing continues to grow exponentially. By 2025, Hawaii needs approximately 65,000 affordable housing units.⁶ Housing is Hawaii's most pressing issue.

FUTURE OF HAWAII'S HOUSING

In the spring of 2019, the University of Hawaii Community Design Center (UHCDC) was engaged to undertake an exploratory research project for the Hawaii Public Housing Authority (HPHA) titled the "Future of Hawaii's Housing."

The UHCDC is "a teaching practice and outreach initiative led by the School of Architecture that provides a new platform for students, staff, faculty, and partnered professionals to collaborate on interdisciplinary applied research, planning, and design projects that serve the public interest. These projects offer service-learning opportunities for students through academic instruction, internship, and post-graduate employment."⁷

The HPHA is the state's primary housing agency managing 85 properties spread across five islands with a total of 6,270 housing units. With properties nearing the average age of 48 years old, the HPHA is need of renovating or replacing a large percentage of its portfolio.

With this in mind, the "HPHA has begun a major initiative to enter into a series of public-private partnerships to redevelop its low-income public housing portfolio into vibrant, mixed-income/mixed-finance communities. HPHA has identified ten properties within its portfolio, most of which are located nearby planned stations of the Honolulu Light Rail System currently being developed by the Honolulu Authority for Rapid Transportation (HART), which could immediately benefit from this initiative."⁸

As the landholder with the largest contiguous sites near the new light rail stations, the HPHA is in the unique position to make a significant contribution towards helping solve Hawaii's housing problem.

A series of questions activated this inquiry: How should we design housing for all in Hawaii? What attributes should be considered that are unique to our context? How do we provide more housing without compromising mountain vistas, parks, or farmlands? How do we provide density without locals feeling overcrowded? How can future residents become involved in the design process of their communities?

The *Future of Hawaii's Housing* project was charged with:

- Framing solutions for all of Hawaii, including residents across the entire state.
- Developing guiding principles and design guidelines for future HPHA developments.
- Increasing community engagement in the design of new HPHA housing projects.

PROJECT STRUCTURE

The Future of Hawaii's Housing project is structured as a multi-phase effort based on quantitative and qualitative research methods, for a spectrum of user populations, on distributed sites, with multiple feedback loops, and distinct but interrelated deliverables.

This paper presents learnings from the first phase of this endeavor.

A bottom-up approach was selected for guiding the project, rooted in the experience of the end-user. Both HPHA residents and Hawaii's citizens were considered as the primary users since future HPHA projects will likely be composed primarily of mixed-use, mixed-income housing. Residents on all islands, spanning rural, suburban, and urban contexts, were also to be considered.

The ability to embed public feedback into the design process at multiple points, the methodology of soliciting, gathering, and analyzing end-user input; and the ability to replicate this process efficiently, became critical to the research.

The process began by collecting qualitative data, through a series of in-home interviews, that would allow families to speak broadly and candidly about what home means to them. The findings that emerged from the analysis of these contextual interviews, together with secondary research, informed the development of a community engagement process, a design framework, three co-creation tools, and a mobile research lab.

This project was led by two principal investigators with graduate and undergraduate student researchers, in collaboration with an ethnographer and design strategist, the team at KPF Urban Interface⁹ and Alison Arieff, design and architecture writer at the New York Times, who assisted with framing the conversation for the general public.

FIELD RESEARCH, DENSITY STUDIES, EXEMPLARS

Thirty in-home interviews were conducted on five islands, Kauai, Oahu, Molokai, Maui, and Hawaii. Qualitative data was collected at 17 public housing properties owned by HPHA. Since the entire team was not able to visit every home, video-based, online digital ethnography

tools were used to collect data remotely. Conversations were recorded, documented, tagged, and analyzed.

In parallel with this qualitative research, secondary research was also conducted through multiple efforts.

To understand the variety of urban densities on the archipelago, 20 half-mile core samples of the urban fabric were analyzed. A typical lot was utilized to identify floor area ratio, dwelling units per acre, and people per square mile.

A second study focused on the analysis of local multi-family housing offerings. Seven dominant local typologies were identified in Honolulu, the state's most urbanized area. These buildings, ranging from the "walk-up," to "monster houses," to podium high rises, served to document and compare floor area ratio, dwelling units per acre, urban edge, number of stories, access to parking, outdoor space, bed/bath ratios, and the existence of other uses or public amenities.

A third exercise, conducted through a third-year undergraduate design studio taught during the Spring 2019 semester, tested low, medium and high-density housing proposals on an existing lot owned by HPHA. The 16-acre lot, currently housing 221 dwelling units, was re-imagined to fit up to 3,500 units.

Finally, a series of local and global case studies were analyzed to inform our understanding of the problem field further; these included projects at multiple scales, from mixed-use urban developments to exemplary buildings, to urban furniture, to digital solutions.

WALKABLE, SUSTAINABLE, EQUITABLE FRAMEWORK

Observations and insights from our conversations with current HPHA residents, in combination with findings from density studies in the Hawaiian archipelago and analysis of existing housing typologies, led to a series of design opportunities.

These 36 design opportunities were clustered into three groups that, in combination, define the ideal community in Hawaii.

- *Walkable* communities respect the human scale, foster social connections, use space efficiently, and support local businesses.
- *Sustainable* communities use resources wisely and maximize efficiency through the use of passive design strategies.
- *Equitable* communities empower citizens through safe, affordable, and accessible living for all.

Each one of these groups is further divided into four subcategories, which are each defined by three aspects.

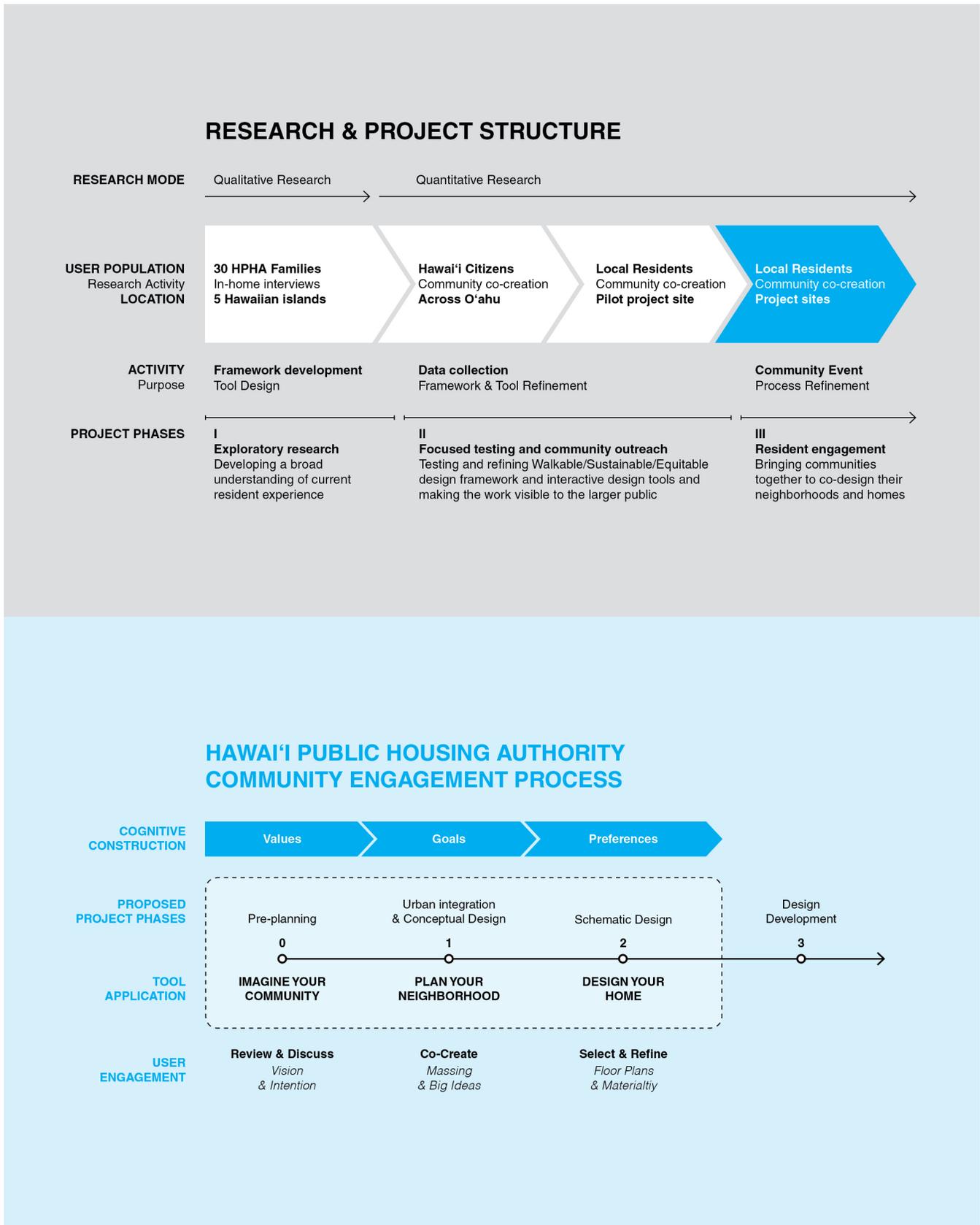


Figure 1. "Future of Hawaii's Housing" project structure and "HPHA Community Engagement Process" diagram. Illustrations by Sierralta, Strawn.

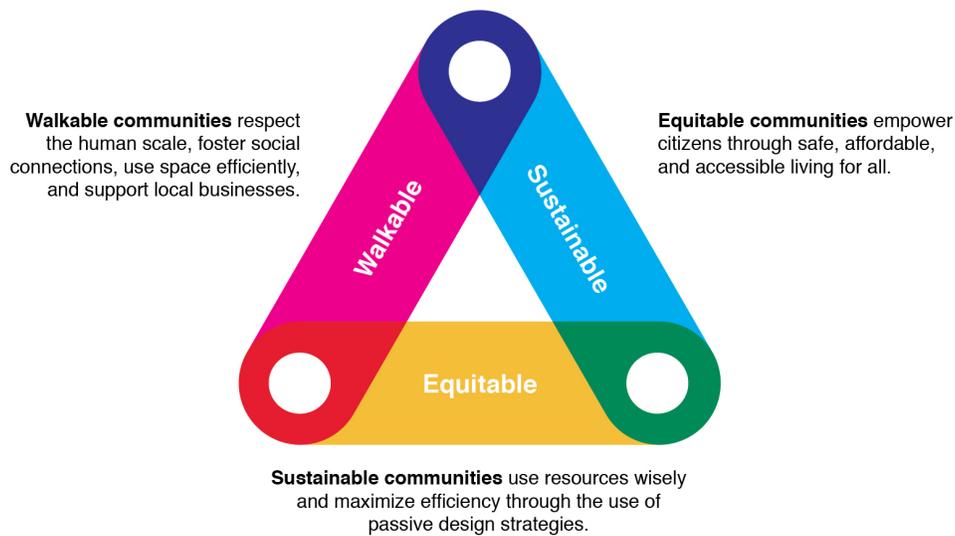


Figure 2. “Walkable, Sustainable, Equitable Design Framework”. Illustration by Sierralta, Strawn.

Walkable communities include the following subcategories:

- *Design for Change*
- *Connect Neighbors*
- *Mix Uses*
- *Put People First*

The *Design for Change* subcategory is composed of the following aspects:

- *Enable co-and multi-generational living:* Ample shared spaces support comfortable co-living and multi-generational households
- *Design for adaptable spaces:* Open floor plans and moveable elements allow residents to organize their space according to their needs
- *Live larger with smart storage:* Adjustable built-in storage nooks, closets, and furniture elements provide for a more flexible living space with a compact footprint.

Our most important learning during this phase was that when people talk about where they live, they don’t just describe their home. They talk about the community, their neighborhoods, and their homes interchangeably. Therefore, the 36 design opportunities also respond to the scales of community, neighborhood, and home. In addition, the digital realm has also become a critical and connective element of our lives, tying together all of the components.

VISUALIZING ATTRIBUTES

Multiple iterations of hand sketches, drawings, and diagrams resulted in 36 final illustrations. Simple graphics and vibrant colors are used to depict these design opportunities in the

form of diagrams, floor plans, isometrics, and sections at multiple scales. The local context and idiosyncrasies of place are depicted through a custom entourage that represents a diversity of ethnicities, tropical flora, and fauna.

Next, we tested the framework through explorations prioritizing five main design opportunities that specifically impact the massing and density of a building or a block, including *Mix Uses*, *Put People First*, *Work with Nature*, and *Nurture Healthy Citizens*.

The 26 resulting studies, all tested on a typical 2-acre block, range from 50 to 250 units per acre across low, mid, and high rise typologies.

Each exploration took into account dwelling units per acre, floor area ratio, access to parking, outdoor space, the continuity of the urban edge, commercial activity, open space, and community amenities.

While these massing depictions are schematic in nature, they demonstrate that high density walkable, sustainable, equitable projects that respect the human scale, allow for cross ventilation in every home, provide individual lanais, hide parking, hold the urban edge for better neighborhood experience, and provide day to day amenities, can take many shapes.

CONCEPTUAL UNDERPINNING: VALUES TO GOALS TO PREFERENCES

The research approach for the community engagement portions of this project was designed with the lenses of social constructivism and social constructionism. The foundational work of Jean Piaget, known as the “father of constructivism,” looks at an individual’s learning within a group setting and the actions that take place in these groups.¹⁰ Social constructionism looks at the ideas, concepts, and artifacts that groups

Design for Change

- 1 Enable co- and multi-generational living.
- 2 Design for adaptable spaces.
- 3 Live larger with smart storage.

Connect Neighbors

- 4 Bring neighbors together outdoors.
- 5 Sync up the community.
- 6 Keep eyes on the street.

Mix Uses

- 7 Envision productive neighborhoods.
- 8 Provide ample parks & plazas.
- 9 Blend civic spaces into daily life.

Put People First

- 10 Build to human scale.
- 11 Make living streets.
- 12 Link multi-modal systems.

Work with Nature

- 13 Be water conscious.
- 14 Allow for cross breezes.
- 15 Follow the sun.

Give Back

- 16 Care for productive lands.
- 17 Reduce, reuse, recycle everyday.
- 18 Encourage skill sharing.

Nurture Healthy Citizens

- 19 Power active lifestyles.
- 20 Provide lanais for all.
- 21 Plan for views & privacy.

Build Responsibly

- 22 Source regional materials.
- 23 Aim for efficiency.
- 24 Anticipate future change.

Support Economic Opportunity

- 25 Ensure accessible equity.
- 26 Bridge the gap.
- 27 Activate micro-businesses.

Share Knowledge

- 28 Track housing availability.
- 29 Streamline household management.
- 30 Map paths to owning.

Celebrate Diversity

- 31 Set aside flex spaces.
- 32 Maximize unit variety.
- 33 Share in multiple languages.

Age in Place

- 34 Take play seriously.
- 35 Explore the neighborhood together.
- 36 Design for all.

Figure 3. Thirty-six design opportunities compose the “WSE Framework”. Illustrations by Sierralta, Strawn, and UHDC team.

TOOL 1

IMAGINE YOUR COMMUNITY

Identifying & categorizing core values



TOOL 2

PLAN YOUR NEIGHBORHOOD

Real-time, metrics-based, urban design



TOOL 3

DESIGN YOUR HOME

Capturing key layout preferences and trade-offs

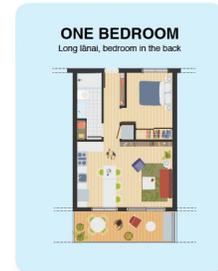


Figure 4. Three co-creation tools for community engagement. Illustrations by Sierralta, Strawn, and UHDCDC team.

produce and their interactions. “Central to social construction is the verb to construct, which implies building something, making something, or bringing something into being that had no existence previously.”¹¹

Social theory suggests a natural framework of decision making where foundational values formed over time, inform goal setting and lead to preference selections that are all influenced by the immediate context.¹²

The engagement tools created and refined for this project are intended to guide community members through activities that help them prioritize values that will serve as scalable guiding principles and design guidelines, assess design implications of planning goals when values directly inform neighborhood massing and organization and negotiate trade-offs when identifying preferences at the scale of the home.

ENGAGEMENT TOOLS: COMMUNITY, NEIGHBORHOOD, HOME

Three community engagement tools were designed to explore the three inhabitation scales of *Community*, *Neighborhood*, and *Home*. Each tool manifests in both the physical and digital realms.

Imagine your Community identifies and categorizes core values. The 36 strategies and illustrations for achieving walkable, sustainable, equitable communities are illustrated on a set of cards. First, respondents select the three design opportunities from each category that are most important to them. Respondents are then asked to pick which of these larger categories they value the most. The third question documents general demographic data. This exercise asks, “How do you imagine your ideal community?”

Plan your Neighborhood provides metrics-based, urban design. This tool, developed by KPF Urban Interface and tailored for

this project to Hawaii’s unique environment, allows the public to explore thousands of design possibilities in real-time. Respondents are able to test density, clustering, street width, grid direction, and transit options to view the effects on walkability, energy efficiency, shading, thermal comfort, and views. This exercise asks, “How would you plan your ideal neighborhood in Hawaii?”

Design your Home captures key unit layout preferences and trade-offs. A set of general demographic data leads the digital survey. Respondents are asked to input the number of people that live in their household and the ideal size for their home considering their current budget. One of a few options must be chosen. This tool tests the importance of cross ventilation, the preference between indoor or outdoor space, and the basic orientation and placement of the bedrooms. This exercise asks, “How would you design your ideal home?”

HAWAII HOUSING LAB: INTERACTIVE ENVIRONMENT

The three tools described above all exist within a physical construct specifically designed for this project. The Hawaii Housing Lab is a platform created to support hands-on, mobile neighborhood research.

The concept of the “honey pot effect”¹³, as developed in the field of human-computer interaction, inspired the design principles for this physical platform. They were intentionally defined to create a construct that would draw locals in by being; familiar and approachable in form and scale, humble and playful in materiality and color, and welcoming and comfortable in layout and programming.

Ultimately, the everyday lawn chair served as the design inspiration for the constructs, reflecting the impromptu nature of their deployment, their natural pose in public spaces, and their inherent, neighborly personality. Individually, their simple,



Figure 5. “Hawaii Housing Lab” conceptual model and pilot launch in Kakaako on Parking Day 2019. Photos by Sierralta, Strawn, and UHDC team.

aluminum frames and woven surfaces serve as hangers for waterproof, printed posters, as tables for co-creation exercises, and simply as chairs for chatting and relaxing. Collectively, they frame communal spaces that allow guests to slow down and interact with one another while they share their thoughts on the future of housing in Hawaii.

The exhibit content, tools, and companion website also follow the character, tonality, and feelings of the physical construct. Colorful, cartoon-like diagrams portray locals in idealized communal and domestic settings, video game-style interface design generates real-time images of neighborhoods tailored to Hawaii's natural and built contexts, and diagrammatic floor plans are populated with objects and furniture that support unique, local lifestyles.

CHOICE ENVIRONMENT & HARVESTING DATA

Preferences are context-sensitive, and the "choice environment" where users form their final selections has significant influence on preference.¹⁴

The lab hosts the three tools that were created to unpack the nested scales of *Community*, *Neighborhood*, and *Home*. They are presented to users in chronological order as they are surrounded by project findings from Phase I of research. Data is reviewed before moving onto the respective tools in the center of the installation and is available for immediate reference as values, goals, and preferences are being identified.

Visitors determine their mode and pace of engagement. Data is collected at the site through the *Hawaii Housing Lab's* website.

PILOTS

The first pilot for the *Hawaii Housing Lab* was launched on Parking Day 2019¹⁵ at a popular retail complex in Kakaako, which is on track to be Honolulu's largest mixed-use neighborhood.

Our team had the opportunity to speak with the general public, discuss our project, and test out all of the tools in a highly public setting. Students were available to individually guide participants through the content and capture inputs with each tool.

A second pilot was launched during the 2019 Building Voices Symposium¹⁶, which focused on the theme "Housing for All" and invited local and global guests to join the conversation about finding solutions for the affordable housing crisis in Hawaii.

During both pilots, dwell times and the speed at which visitors moved through the content and engaged with the tools varied widely, with some users wanting to discuss each design opportunity and tools at great length while others utilized the website directly to interact with the tools on their personal smartphones to move through the process more quickly. Multiple requests for QR code links to the individual tools indicated a desire by some to speed up the feedback cycle even more.

NEXT STEPS

The results of the first phase of this multi-year research project support the planning and design of future HPHA developments, aligning pre-planning, urban integration, conceptual design, and schematic design with co-creation activities facilitated with the three newly developed tools. This community engagement process supports the discrete steps that form the cognitive foundations of decision-making. User co-creation can take place across multiple community meetings or can be "stacked" into one event.

The lab is scheduled to travel across Oahu, inviting a broader cross-section of citizens and community members to explore and share their preferences. Quantitative data will be collected, and tools will continue to be fine-tuned.

The following phase of the research project will test the community engagement process and the Walkable, Sustainable, Equitable Framework through the design of a housing development on one of the Hawaiian islands.

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