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Designing for the Unfinished: PREVI Lima and the Architecture of Incremental Growth

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Abstract

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Incremental housing reconceptualizes the dwelling as an open-ended process rather than a finished object. This paper theorizes the seed dwelling as a spatial and structural framework that embeds the capacity for growth within its original form, distinguishing it from housing that merely tolerates informal extension. Through cross-case analysis of eight proposals from the PREVI Lima Experimental Housing Project (1967–1976), the study identifies three principles enabling resident-driven growth: the interior courtyard as spatial reserve; load-bearing party walls oriented perpendicular to the street; and a fixed service core that anchors infrastructure while maximizing flexibility. By applying a tri-scalar interpretive framework derived from open building theory to a systematic comparative analysis of PREVI proposals, the paper makes two original contributions. First, it proposes a design taxonomy — the three-principle seed-dwelling model — that operationalizes the theoretical distinction between housing that tolerates growth and housing that structures it. Second, it recovers underexamined cases from the PREVI archive, notably the Colombian and Peruvian proposals, which enrich and test the robustness of this taxonomy across different architectural genealogies. Comparative analysis with Belapur and Elemental Chile confirms cross-cultural transferability: well-designed seed dwellings reduce expansion costs and generate household equity. By framing housing as temporal infrastructure, the model offers a practical spatial grammar for affordable housing in rapidly urbanizing regions.

Keywords: Incremental housing; PREVI Lima; Seed dwelling; Anticipated growth; Process-based design; Participatory urbanism; Affordable housing

1. Introduction

1.1 Background and Context

The global housing deficit is, at its core, a temporal problem. Conventional mass-housing production delivers a finished product at a fixed moment in time, calibrated for a hypothetical average family, and then leaves residents to improvise subsequent adaptations on their own terms. In rapidly urbanizing cities of the Global South, where household size, income, and spatial needs shift continuously, this model produces dwellings that are obsolete almost from the moment of occupancy (Alam, 2025; Martínez Muñoz & Maroto, 2024). Self-build extensions, room additions, commercial annexes, and rental subdivisions accumulate outside the original architectural frame because the frame offered no designed path for them.

During the mid-twentieth century, there was a focused but ultimately incomplete effort to resolve this contradiction. A generation of architects and urban theorists operating within the overlapping currents of structuralism, Team X criticism, Metabolism urbanism, and emerging participatory design began to ask whether the house could be conceived differently: not as a closed object but as an open armature; not as a product but as a protocol. The PREVI Lima Experimental Housing Project (Proyecto Experimental de Vivienda, 1967–1976), commissioned by the Peruvian government with United Nations support, was the most ambitious material laboratory for this question. It brought together thirteen international teams and thirteen Peruvian teams to design, construct, and subsequently document the performance of low-cost housing that embedded the capacity for growth within its own spatial and structural logic (Land, 2015; García-Huidobro, Torres, & Tugás, 2005).

Nearly six decades later, the original units at PREVI have been transformed beyond recognition by their residents. This fact, widely observed by researchers since the 1990s, has been interpreted in two opposed ways. A pessimistic reading sees the transformations as evidence of the project's failure to anticipate user needs. An optimistic reading, pursued in this paper, sees them as evidence of precisely the intended relationship between designed seed and resident-driven growth.

1.2 Problem Statement and Research Gap

The literature on PREVI is rich but often divided across disciplines. Architectural historians focus on the typological and stylistic aspects of individual teams (Lucas, Salas, & Barrionuevo, 2012; Kahatt, 2017). Urban sociologists examine post-occupancy transformation as evidence of resident agency (García-Huidobro et al., 2010; Gyger, 2013). Housing policy researchers compare PREVI with contemporary programs like Elemental in Chile (Pérez Pérez & González, 2011; O'Brien, Carrasco, & Dovey, 2020). What remains underexplored is the cross-scalar spatial logic that made some PREVI proposals more effective as seed dwellings than others: specifically, why certain design decisions at the dwelling-unit scale consistently enabled growth while others impeded it, and how those unit-scale decisions either reinforce or undermine performance at the cluster and street levels. No existing study applies a systematic, principle-based comparative framework across a broad range of PREVI proposals, including its less-studied Colombian and Peruvian entries, to answer this question.

This gap matters because contemporary incremental housing practice, from Elemental's half-houses to site-and-services programs in sub-Saharan Africa and Southeast Asia, still lacks a coherent design vocabulary for encoding growth. The field has inherited the policy concept of incremental delivery but lacks the spatial grammar that distinguishes a seed dwelling from a merely incomplete one (De Paris et al., 2023; Viriezky, Susanto, & Alkadri, 2025). This paper draws a specific distinction between housing that merely tolerates growth — permitting additions without guiding them — and the seed dwelling, which encodes growth within its original spatial and structural form.

1.3 Objectives and Research Questions

This paper pursues three objectives: (1) to theorize the seed dwelling as a distinct housing typology defined not by its initial size but by the spatial and structural intelligence embedded within it; (2) to identify, through cross-case analysis of eight PREVI proposals and two comparative cases, the recurring design principles that operationalize growth at three spatial scales; and (3) to situate this historical re-reading within contemporary debates on housing adaptability, open building, and process-based urbanism.

The guiding research question is: what spatial and structural principles distinguish a seed dwelling that enables systematic growth from one that merely tolerates it, and how were these principles embodied in the design proposals of PREVI Lima?

The paper proposes that three key spatial elements—the interior courtyard, the load-bearing party wall perpendicular to the street, and the fixed service core—are likely to be most significant for systematic growth, serving as a working analytical framework. The study tests whether these elements consistently facilitate success and are enough to account for variations in post-occupancy performance through a cross-case analysis.

1.4 Significance and Structure of the Paper

The contribution of this paper operates on two levels. Theoretically, it proposes a design taxonomy—the three-principles seed-dwelling model—that links the structuralist thought of Team X and the open building theory of Habraken to contemporary affordability challenges in the Global South. It offers a more precise analytical tool than the broad concept of incremental housing commonly used in scholarship and policy. Practically, it provides a new interpretation of PREVI as a design laboratory whose lessons remain immediately applicable to architects, planners, and policymakers confronting rapid urbanization. This is particularly evident in the analysis of the Colombian and Peruvian proposals, which have received significantly less scholarly attention than the European teams despite their typological sophistication and foundation in Latin American spatial traditions.

The paper proceeds as follows. Section 2 describes the materials and methods, including the tri-scalar interpretive framework and the three unit-scale principles that form the primary analytical criteria. Section 3 presents the three principles as the main findings of the cross-case analysis, operating fundamentally at the dwelling-unit scale. Section 4 situates these findings in comparative perspective against Belapur and Elemental and examines their theoretical and economic implications. Section 5 concludes by summarizing the study's contributions, drawing implications for housing policy and design practice, and identifying directions for future research.

2. Materials and Methods

2.1 Methodological Framework

This paper employs a qualitative, case-based design-historical methodology. The study treats each PREVI housing proposal as a unit of analysis and examines it through a tri-scalar interpretive framework derived from two established theoretical traditions: Habraken's open building theory, which distinguishes hierarchically between the urban fabric, the base building (support), and the infill level (Kendall, 2017; van der Werf, 2025), and recent morphological research on informal settlement adaptability, which demonstrates that incremental growth operates simultaneously across nested spatial scales (Martínez Muñoz & Maroto, 2024; Alegría & Dovey, 2024).

The three scales that structure the interpretive context are:

- **Scale 1 — Dwelling unit:** the spatial and structural organization of the individual unit as a seed for future growth.
- **Scale 2 — Housing cluster:** the aggregation logic that determines how units connect to shared outdoor space and neighboring units.
- **Scale 3 — Urban interface:** the public-private gradient at the street edge and its capacity to accommodate changing uses over time.

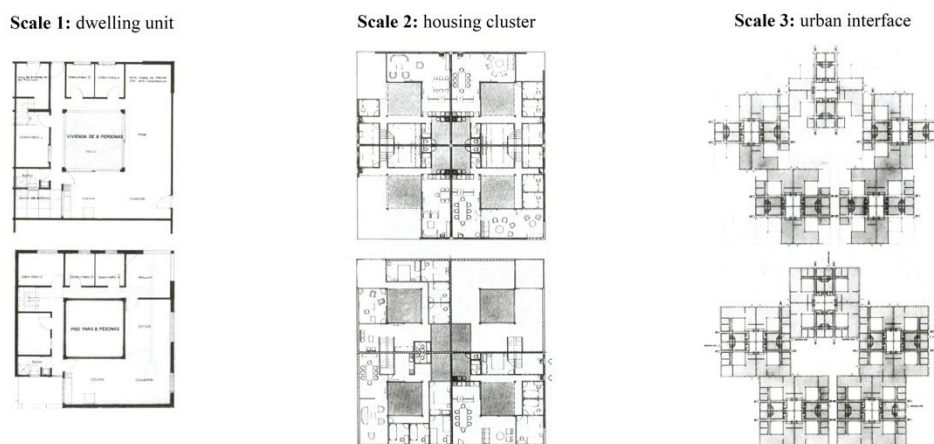


Figure 1. PREVI Lima, James Stirling Project (1969-1973) tri-scalar analysis. Scale 1 — dwelling unit; Scale 2 — housing cluster aggregation; Scale 3 — urban interface. (Source: Adapted from *El Proyecto Experimental de Vivienda (PREVI)*, Lima (p. 286 & 291) by P. Land (Ed.), 2015, Universidad de los Andes, Bogotá, Colombia).

The systematic analytical work in this paper mainly focuses on Scale 1. It evaluates three spatial principles — the interior courtyard (P1), load-bearing party walls perpendicular to the street (P2), and the fixed service core (P3) — to determine their presence, absence, or partial presence in each of the eight PREVI proposals and two comparative cases. Observations at Scales 2 and 3 are included selectively, where documentation allows, to demonstrate how decisions at the unit scale either support or weaken performance at the cluster and street levels. They serve as contextual evidence rather than as a separate set of systematically coded criteria.

This analysis provides a design-theoretical taxonomy based on unit-scale spatial logic, set within a wider scalar framework that explains how incremental growth functions.

The overall research logic proceeds in three sequential phases. The first phase constructs the analytical framework by synthesizing theoretical inputs from open building theory, structuralist urbanism, and morphological housing research, from which the three hypothesized spatial principles at Scale 1 are derived. The second phase applies these principles across all eight PREVI proposals and two comparative cases, assessing each for the presence, absence, or partial presence of P1, P2, and P3, while incorporating cluster- and street-scale observations selectively where the evidence base supports them. The third phase synthesizes the cross-case patterns and tests their cross-cultural transferability against Belapur (1983–86) and Elemental Chile (2003–13), two projects that are geographically and temporally distinct from PREVI but share its foundational commitment to designed-in growth.

2.2 Case Selection

Eight PREVI proposals were selected for primary analysis on two criteria: (a) they represent substantially different design strategies for encoding incremental growth, and (b) they are sufficiently documented in the secondary literature to permit reconstruction of both original design intention and post-occupancy outcome. The eight cases are:

1. **Candilis, Josic & Woods** (France / international): parallel wide and narrow bay system; two-courtyard unit within the wide bay; services fixed in the narrow bay; structural long walls with tie-beams guiding incremental expansion.
2. **James Stirling** (United Kingdom / international): L-shaped patio dwelling; perpendicular load-bearing party walls; concentrated service spine; cluster of four units around a shared court.
3. **Íñiguez de Ozoño & Vázquez de Castro** (Spain / international): minimum courtyard unit; structural capacity of the two-story building is encoded in the foundation from the beginning; standardized growth module.
4. **Kikutake, Kurokawa & Maki** (Japan / international): Metabolist frame-and-capsule logic; prefabricated module additions; diagonal growth trajectory.
5. **Herbert Ohl** (Germany / international): industrialized tridimensional modular system; heavy prefabrication; strip configuration.
6. **Samper, Esguerra, Sáenz & Urdaneta** (Colombia / international): courtyard-based typology rooted in the Latin American patio house; load-bearing masonry party walls; systematic growth module.
7. **Miró-Quesada, Núñez & Williams** (Peru / national): two parallel bays — a wide flexible bay and a narrow service bay; front and rear courtyard system; RC cast-in-situ walls.

8. **Atelier 5** (Switzerland / international): mat-building approach; continuous shared courtyard system; load-bearing party walls perpendicular to the street.

The selection deliberately includes both high-performing and low-performing cases. The presence of clear unsuccessful cases — Ohl and Kikutake–Kurokawa–Maki — is methodologically necessary: the three principles can only be treated as genuinely predictive if they are absent in cases where incremental growth failed, not merely present in cases where it succeeded.

Two comparative cases extend the analysis beyond Lima:

- **Belapur Incremental Housing** (Charles Correa, New Bombay, 1983–1986): selected for its systematic documentation of cluster-scale growth regulation in a different climatic, economic, and constructive context.
- **Elemental** (Quinta Monroy / Villa Verde, Chile, 2003–2013): selected as a contemporary institutional incremental housing program whose design logic is explicitly informed by the same foundational principles as PREVI, and for which post-occupancy economic data is available.

2.3 Data Sources

Primary materials consist of the original competition drawings and briefs documented in Land (2015), and the forty-year post-occupancy record compiled by García-Huidobro, Torres, and Tugás (2005, 2010), which includes sketch surveys overlaid on original plans and photographic documentation of resident-driven transformations. Secondary materials include the doctoral research of Lucas Alonso (2015), which reconstructs growth trajectories at the cluster level and provides the most granular comparative post-occupancy evidence available for PREVI; the contextual analyses of Kahatt (2017), situating PREVI within Lima's broader history of progressive housing; and comparative documentation for Belapur (Mendes et al., 2013; Setti, 2022) and Elemental (O'Brien et al., 2020; Carrasco & O'Brien, 2021, 2022).

The study is entirely documentary: no new fieldwork was undertaken. Post-occupancy assessments are, therefore, interpretive readings of the published record rather than independent empirical surveys, and their reliability is necessarily bounded by the depth and evenness of that record. This is discussed as a limitation in Section 5.

2.4 Analytical Criteria at Scale 1

Each case is examined at the dwelling-unit scale for the presence, absence, or partial presence of three spatial elements, each hypothesized as a primary enabler of systematic incremental growth:

Principle 1 — Interior courtyard or light well. An open-to-sky space within the unit, designed not just as an amenity but as a flexible area: large enough to accommodate one or more room additions at full buildout while ensuring sufficient natural light and ventilation for all surrounding rooms.

Principle 2 — Load-bearing party walls perpendicular to the street. A structural setup that provides lateral resistance for vertical expansion without requiring the original facade wall to carry new loads; defines a clear structural bay that can support an additional floor at any point during the building's life; and marks the lateral property boundary as a permanent, structurally significant dividing line.

Principle 3 — Fixed Service Core. A centralized zone housing all wet rooms—kitchen, bathroom, and utility services—whose permanence provides a stable infrastructure anchor. By consolidating all plumbing connections in a single location, the design ensures that the cost and complexity of relocating services do not impede spatial reconfiguration as household needs evolve.

For each case, the analysis also notes whether the constructive system encoding these principles was replicable by non-professional builders using locally available materials and skills — a condition the literature identifies as essential for principles to function as genuine seed-dwelling infrastructure rather than as designer intentions that could never be activated by residents (Alam, 2025; Viriezy et al., 2025).

2.5 Analytical Procedure

The analysis proceeded inductively. Each of the eight PREVI cases was examined individually before conducting a cross-case comparison. The three principles were not imposed as a predetermined classification. Instead, they emerged inductively from the comparison as the spatial features that consistently recurred in the highest-performing cases while being absent or only partially present in the lowest-performing ones. The analysis, therefore, identifies the taxonomy as an empirical finding rather than a preconceived framework.

Results are synthesized in two complementary formats: (a) a qualitative case-by-case narrative in Section 3 tracing the spatial logic of each principle across the eight proposals, drawing on post-occupancy evidence where available; and (b) a summary evaluation table (Table 1) that rates the presence or absence of each principle per case alongside cluster-scale and interface-scale observations derived from the secondary literature, and relates these to overall documented incremental performance. The post-occupancy performance ratings in Table 1 draw primarily on Lucas Alonso (2015) and García-Huidobro et al. (2005, 2010) as the two most comprehensive comparative sources. Section 4 then situates the three-principle taxonomy within the comparative cases of Belapur and Elemental and examines its theoretical and economic implications.

3. Results

3.1 Terminological Clarification: Tolerated Growth vs. Seed Dwelling

Before presenting the findings, a terminological clarification is necessary. The literature on incremental housing tends to conflate two fundamentally different strategies. The first, which might be called tolerated growth, provides a minimum dwelling that does not actively impede subsequent additions but offers no structural or spatial guidance for them. Most site and services programs fall into this category; the initial unit is a core house that residents expand according to their own resources and decisions, often at the cost of light, ventilation, and structural integrity in adjacent units (Alam, 2025; Dovey & Recio, 2023).

The second strategy, which this paper defines as the seed dwelling, is qualitatively different. A seed dwelling encodes growth within its original form: the structure is dimensioned for vertical extension, the courtyard is positioned to absorb additions without blocking light to adjacent rooms, the service core is placed to maximize the flexibility of all remaining space, and the cluster geometry is designed so that individual unit growth does not foreclose collective space. The seed dwelling is, in Habraken's terminology, a support that anticipates a range of infills — but it goes beyond Habraken's framework in that the support and the initial infill are spatially integrated from the outset, and the growth path is not merely possible but is spatially invited by the form.

This distinction — between housing that tolerates growth and housing that structures it — is the central theoretical contribution of this paper.

3.2 Principle 1: The Interior Courtyard or Light Well

The most consistently enabling spatial element across high-performing cases is the interior courtyard or light well. In the proposals by Atelier 5, Íñiguez de Ozoño & Vázquez de Castro, James Stirling, Samper-Esguerra-Sáenz-Urdaneta, and Miró-Quesada-Núñez-Williams, the courtyard performs a dual function: it provides daylight and ventilation to the original unit, and it constitutes a residual space that can absorb room additions without depriving other rooms of light or cross-ventilation. As the dwelling grows, the courtyard shrinks — but its initial dimensions anticipate this contraction and ensure that a minimum open-to-sky condition is maintained even at full buildout.

Atelier 5 deploys this logic at cluster scale: the system of shared courts between units creates a continuous field of outdoor space that is neither purely public nor purely private, and into which incremental additions can be projected without blocking circulation between adjacent units. Post-occupancy surveys confirm that Atelier 5 units showed substantially higher rates of successful vertical and horizontal extension than units in proposals that relied on a single deep plan without internal light-giving voids (Lucas Alonso, 2015). Growth proceeded in two principal directions: upward (addition of upper storeys within the structural bay defined by the perpendicular party walls) and lateral into the shared courtyard field — a process that was self-limiting because the mat geometry made any extension beyond the defined unit boundary geometrically legible and socially contested.

Stirling's L-shaped plan deploys the courtyard principle in a different register: the private patio defined by the two wings of the L serves as a growth reserve for horizontal additions. Because two of the four interior-facing facades are free of party-wall constraints, the patio can absorb added rooms without affecting neighboring units' light or access. Post-occupancy documentation confirms that additions into the patio zone followed the structural bay implied by the original plan, so that expanded Stirling units read as the completion of a pre-established figure rather than an improvised accumulation (Land, 2015; García-Huidobro et al., 2010). Critically, the patio also served as a buffer against inappropriate encroachment on collective circulation: the geometric definition of the L-perimeter made it physically difficult for residents to extend beyond the designed growth envelope, a rare case of form acting as self-regulating zoning (Lucas Alonso, 2015).

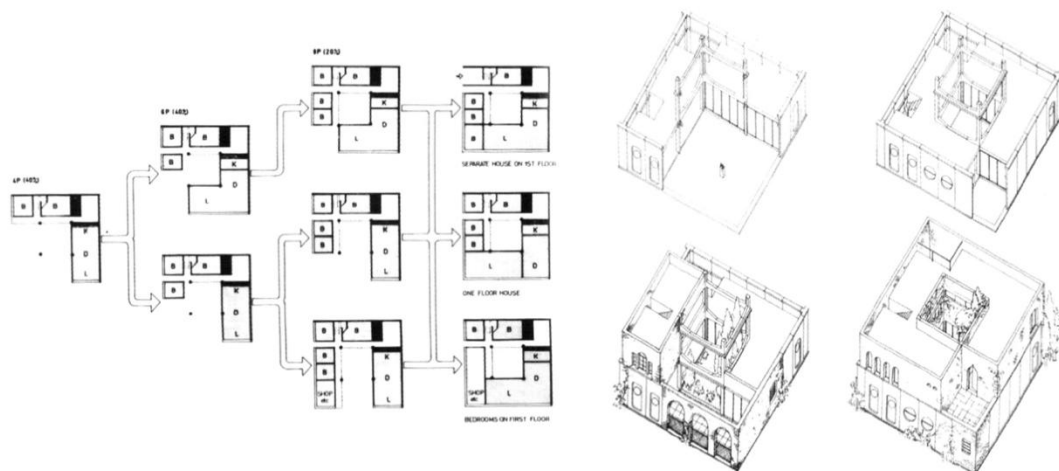


Figure 2. PREVI Lima, James Stirling Project (1969-1973). Incremental scheme. Growing possible routes around the courtyard. (Source: *El Proyecto Experimental de Vivienda (PREVI)*, Lima (p. 285) by P. Land (Ed.), 2015, Universidad de los Andes, Bogotá, Colombia).

Íñiguez de Ozoño & Vázquez de Castro place a private courtyard at the center of the minimum unit, sized to remain functional as a light well even after the maximum intended horizontal addition has been completed. This explicit courtyard-dimensioning-for-full-buildout distinguishes it from proposals that include outdoor space as an amenity rather than as a structural growth device. The proposal's direct genealogy from the Spanish *poblados dirigidos* tradition — particularly the Caño Roto project (1957–1959), which the same architects had designed with a comparable courtyard typology for working-class residents — explains the typological confidence with which the growth sequence was encoded (Lucas Alonso, 2015).

Samper, Esguerra, Sáenz & Urdaneta (Colombia) bring to PREVI a typological tradition directly rooted in the Latin American patio house. Their proposal organizes the dwelling around a central patio that functions simultaneously as the primary light source, the main social space, and the spatial reserve for future horizontal additions. The perimeter walls are dimensioned for a second storey from the outset, and service spaces are consolidated along one party wall, leaving the courtyard-facing rooms entirely free of fixed infrastructure. Growth proceeds in a clear sequence: the patio contracts progressively as rooms are added around it, but its minimum dimension at full buildout was verified in the competition drawings. Post-occupancy evidence shows that residents understood and followed this logic more often than in proposals where growth paths were implicit rather than explicit (Lucas Alonso, 2015; Land, 2015). This Colombian proposal, therefore, represents an independent convergence on the same spatial principles as the Swiss mat (Atelier 5) and the British L-patio (Stirling), arriving there through the Andean-Colombian courtyard tradition rather than through European modernism.

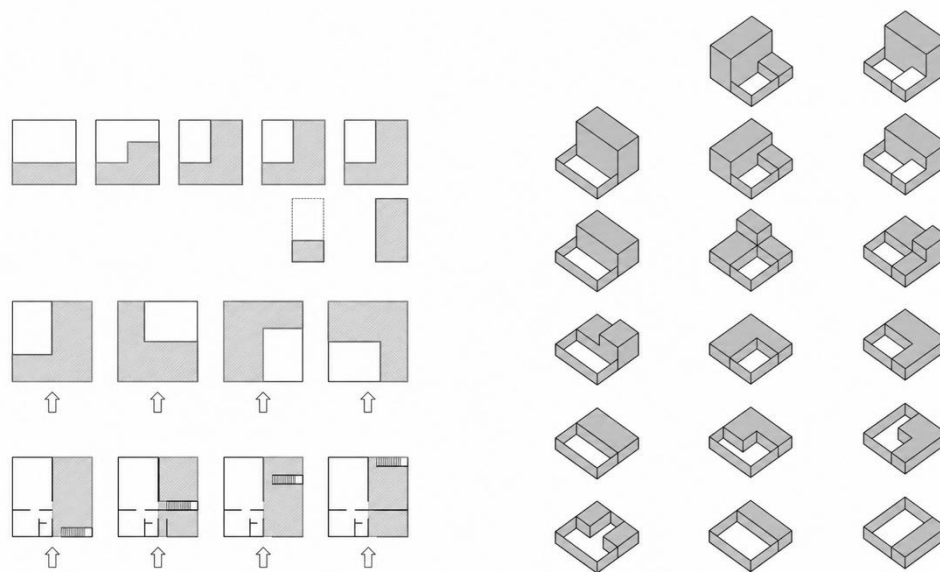


Figure 3. PREVI Lima, Samper, Esguerra, Sáenz & Urdaneta Project (1969-1973). Incremental scheme. Growing possible routes around the courtyard and stairs, and possible locations. (Source: Developed by the author).

Miró-Quesada, Núñez & Williams (Peru) propose a different spatial model that nonetheless shares the courtyard logic: two parallel structural bays — a wide, flexible bay containing living and sleeping spaces, and a narrow service bay housing kitchen, bathroom, staircase, and entries — define the growth framework, with front and rear courtyards providing light and ventilation to both bays at all stages of construction (Land, 2015). The front courtyard is public-facing and accommodates future commercial or semi-public additions; the rear courtyard serves as a service buffer. Growth proceeds in two complementary directions: vertical (addition of a full second storey within the same structural frame) and horizontal (extension of the wide bay by adding sections at either end). The plan can grow from a minimal seed of approximately 40 m² to a fully built two-storey dwelling of 110–120 m² without disrupting either the service infrastructure or the courtyard system. This dual-bay strategy, described in detail by Land (2015), represents the most spatially explicit growth sequence of the Peruvian proposals for the competition.

Candilis, Josic & Woods deploy a parallel bay system in which two courtyards are integrated within the wide bay: one at the front of the unit and one at its center. Both courtyards provide natural light and cross-ventilation to all rooms at the initial stage of construction (Land, 2015). However, the courtyards are not dimensioned as explicit growth reserves in the way that Stirling's L-patio or the Colombian team's central patio are: their dimensions are determined by the bay geometry rather than by a calculated buildout sequence, and post-occupancy evidence suggests that vertical additions frequently compromised their ventilation function as residents infilled them (Lucas Alonso, 2015). The principle is therefore partially present: the courtyard exists but does not fully encode the growth logic of a seed dwelling.

Kikutake, Kurokawa & Maki illustrate the inverse case. Their frame-and-capsule Metabolist logic anticipated growth by adding prefabricated capsule modules to a permanent concrete frame. In practice, this strategy failed at PREVI because the capsule additions required factory-produced components that were never available to residents, and the frame structure was too specialized for informal local construction. The courtyard principle is entirely absent from this

proposal; the dense frame generates internal spaces with poor natural light and no spatial reserve for incremental addition without structural complication. (Takeuchi & Guatelli, 2020; Land, 2015).

Herbert Ohl's proposal deploys large-scale industrial prefabrication: three-dimensional concrete modules approximately six tons each, assembled on-site using tower cranes. The spatial logic of the proposal is essentially determined by the module geometry and the crane radius, resulting in strip configurations with no internal courtyard and no meaningful growth zone at the unit level. The proposal was the only one in the international section that could not be completed even in its initial phase by professional contractors, let alone adapted by residents. As Lucas Alonso (2015) and Land (2015) both record, the constructive complexity was simply irreconcilable with the material and logistical reality of Lima in the early 1970s, making any assessment of its incremental performance hypothetical.

3.3 Principle 2: Load-Bearing Party Walls Perpendicular to the Street

The second transversal principle is the deployment of load-bearing masonry party walls oriented perpendicular to the street facade. This structural choice encodes growth potential in three ways: it provides the lateral resistance needed for vertical extension without requiring the original facade wall to bear additional loads; it defines a clear structural bay that can accommodate an additional floor at any point in the dwelling's life; and it establishes the property boundary as a permanent, structurally meaningful threshold rather than an arbitrary line on the ground.

Íñiguez de Ozoño & Vázquez de Castro dimension their party walls from the outset for two-storey height with an expressed foundation capable of accepting a third storey; the ground floor is explicitly conceived as a seed that anticipates vertical doubling. Lucas, Salas, and Barrionuevo (2012) note that this proposal, more than any other at PREVI, maintained structural integrity through resident-driven vertical additions because the structural grammar of the original design was legible enough to guide extension. Exposed rebar stubs at the tops of the ground-floor walls — a standard feature in incremental construction throughout Latin America — indicated to residents precisely where to begin their vertical additions.

Stirling's party walls running perpendicular to the street define two clear structural bays. The wall thickness and footing dimensions in Stirling's competition drawings — reproduced in Land (2015) — are significantly greater than required for a single storey: a deliberate structural overdesign that anticipates vertical extension without requiring any later structural intervention by the resident.

Samper, Esguerra, Sáenz & Urdaneta deploy a reinforced brick wall system — directly related to their earlier Colombian social housing practice — in which the perpendicular party walls are not only load-bearing but also define the maximum lateral extent of each unit, preventing encroachment onto the adjacent unit's growth zone. Land (2015) notes explicitly that the Colombian proposal used the same wall and floor system as the Íñiguez de Ozoño project, though with slightly different wall thicknesses to account for the different spans, plan forms, and seismic load distribution. This shared, constructive logic between a Spanish and a Colombian team points to a common lineage in Mediterranean-influenced courtyard housing, well-suited to the Peruvian climate.

Miró-Quesada, Núñez & Williams use RC cast-in-situ walls for both the long structural walls parallel to the lot depth and the short cross walls that define bays. The formwork system employed — standardized small sectional steel panels, each liftable by one person — was developed for this project specifically to enable residents or local contractors to replicate the construction system during later growth phases without specialized equipment (Land, 2015). This is a rare example within PREVI of a construction technology explicitly designed for incremental replication by non-professional builders, anticipating what contemporary incremental housing literature terms "construction literacy" (Alam, 2025).

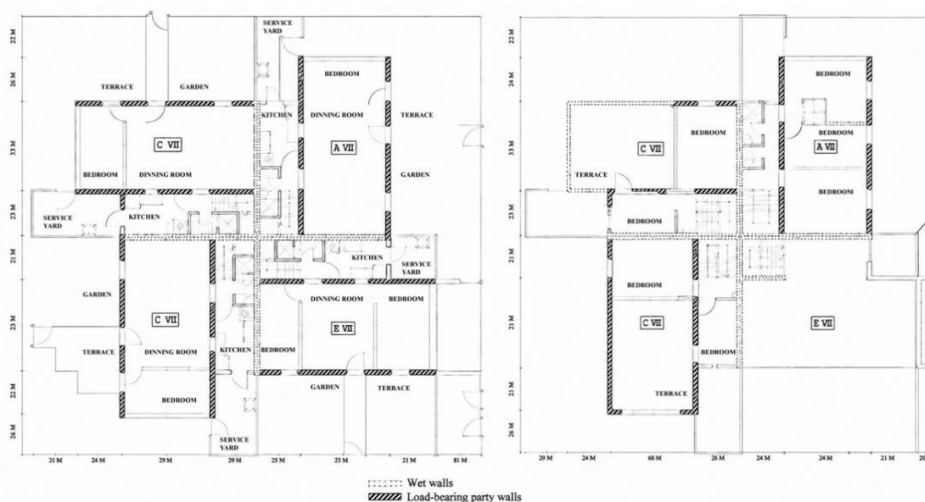


Figure 4. PREVI Lima, Miró-Quesada, Núñez & Williams Project (1969-1973). Load-bearing party walls and wet walls in a cluster of 4 units. (Source: Original drawings from El Proyecto Experimental de Vivienda (PREVI), Lima (p. 395) by P. Land (Ed.), 2015, Universidad de los Andes, Bogotá, Colombia. Load-bearing walls and wet walls hatching by the author).

Kikutake, Kurokawa & Maki, and Herbert Ohl both lack this principle in any form accessible to non-professional builders. Both treat growth as a technical problem requiring factory components. The lesson — confirmed by research in Indonesia (Viriezky et al., 2025) and Bangladesh (Alam, 2025) — is that structural growth infrastructure must be constructable with locally available skills and materials to function as a genuine seed dwelling.

Candilis, Josic & Woods deploy three or four long parallel structural walls running the depth of the lot, spaced 4.0 m (wide bay) and 2.6 m (narrow bay) apart, with cross tie-beams cast at both floor levels from the outset to guide the future placement of walls and locate courtyards at all stages of expansion (Land, 2015). This structural system encodes growth in the longitudinal direction — horizontal extension of the bays — and provides moderate support for vertical extension within the established bay widths. However, the long walls run parallel to the street rather than perpendicular to it, which means the structural bay does not define a clear property boundary in the lateral direction, leaving the limits of each unit less legible than in proposals with perpendicular party walls. The principle is therefore partially present: the structural grammar guides growth but does not define the clear lateral property threshold that perpendicular party walls provide.

3.4 Principle 3: The Fixed Service Core

The third principle is the concentration of wet rooms — kitchen, bathroom, and utility services — in a single fixed core within the dwelling unit. This core functions as the immovable infrastructure anchor around which all other spaces remain genuinely flexible. By concentrating all service connections (water, sewage, and electrical entry point) in one location, the design ensures that the high cost and complexity of relocating plumbing does not act as a hidden obstacle to spatial reconfiguration as the family grows.

Stirling's proposal groups the kitchen and bathroom along a single service spine running parallel to one of the party walls — an arrangement that leaves the three remaining sides of the L-shaped plan entirely free of service infrastructure and available for addition without plumbing cost. This linear concentration of services along a party wall is structurally efficient as well: the spine doubles as a shear wall, providing additional lateral stability independent of the facade and further facilitating vertical extension (Land, 2015).

Atelier 5 and **Íñiguez de Ozoño** adopt comparable service-core strategies, anchoring wet rooms against the party wall at the rear of the unit so that all street-facing and courtyard-facing rooms remain infrastructure-free.

Samper, Esguerra, Sáenz & Urdaneta consolidate the service core — bathroom, kitchen, staircase — along one-party wall, which simultaneously serves as the party wall between adjacent units and as the infrastructure spine of the dwelling. This solution, which condenses the most technically complex components of the house into a single firewall-thick element, proved highly legible to residents: post-occupancy documentation shows that the service core was among the least-modified elements across the entire PREVI site, while the rooms around the courtyard were extensively reconfigured (Lucas Alonso, 2015).

Miró-Quesada, Núñez & Williams assign the entire narrow bay — a strip approximately 2.20 m wide running the full depth of the lot — to the service functions (kitchen, toilet, staircase, entries). This narrow bay is structurally independent of the wide bay, allowing additions to the wide bay without disturbing the service infrastructure. The concentration of all plumbing within a fixed 2.20 m strip and the spatial separation of this strip from all living and sleeping spaces constitute one of the most clearly resolved service-core strategies in the entire PREVI competition (Land, 2015).



Figure 5. PREVI Lima, Miró-Quesada, Núñez & Williams Project (1969-1973). Fixed service core at different stages of growth. (Source: Original drawings from *El Proyecto Experimental de Vivienda (PREVI)*, Lima (p. 389) by P. Land (Ed.), 2015, Universidad de los Andes, Bogotá, Colombia. Service core hatching by the author).

Candilis, Josic & Woods concentrate the kitchen and bathroom within the narrow bay — a fixed strip that runs the full depth of the lot alongside the wide living bay. This arrangement functions as a partial service core: all wet infrastructure is confined to one structural zone, and a second toilet can be located directly above the ground-floor installation on the upper level (Land, 2015). The partial character of this solution lies in the fact that the narrow bay also contains small bedrooms, so it is not a pure service zone but a mixed strip. As a result, it provides infrastructure stability, liberating the remaining space from service constraints. P3 is therefore partially present.

Kikutake, Kurokawa & Maki, and **Herbert Ohl** both lack a clearly fixed service core: in the capsule system, service infrastructure is distributed across the modular components, and in the Ohl system, it is embedded in the prefabricated modules in a way that is inaccessible without heavy equipment. The absence of a legible, fixable service core is a significant reason both proposals failed to enable resident-driven growth.

3.5 Synthesis: Incremental Performance Matrix

The three principles achieve their greatest effectiveness when they operate simultaneously and coherently across all three scales. Table 1 summarizes the extent to which each principle is present, partial, or absent across the eight case studies and relates this distribution to their documented incremental performance. Performance is assessed on a three-point scale (high, partial, or low), reflecting the level of resident-driven expansion observed over the forty-year post-occupancy period.

Table 1. Incremental Performance Matrix: PREVI Cases (Sources: Land (2015); García-Huidobro et al. (2005, 2010); Lucas Alonso (2015)).

Case	Country	Internal Courtyard	Load-Bearing Party Walls	Fixed Service Core	Cluster Absorbs Growth	Interface Permits Mixed Use	Overall Incremental Performance
Candilis, Josic & Woods	France	Partial (2 internal patios)	Partial	Partial	Moderate	Moderate	Moderate
James Stirling	UK	Present (L-patio)	Present	Present	High	High	High
Íñiguez de Ozoño & Vázquez de Castro	Spain	Present (central)	Present	Present	High	Moderate	High
Kikutake, Kurokawa & Maki	Japan	Absent	Absent (frame)	Absent (capsule)	Low	Low	Low
Herbert Ohl	Germany	Absent	Absent (modules)	Absent	Low (not built)	Low	Very Low
Samper, Esguerra, Sáenz & Urdaneta	Colombia	Present (patio)	Present	Present	High	Moderate	High
Miró-Quesada, Núñez & Williams	Peru	Present (front+rear)	Present	Present (narrow bay)	High	High	High
Atelier 5	Switzerland	Present (shared mat)	Present	Present	High	Moderate	High

4. Discussion

4.1 Interpretation of Key Findings

The results confirm the central hypothesis: the simultaneous integration of the three principles consistently predicts high incremental performance. **Atelier 5, Íñiguez de Ozoño & Vázquez de Castro, Stirling, Samper, Esguerra, Sáenz & Urdaneta, and Miró-Quesada, Núñez & Williams** provide the clearest examples of this integrated approach the fixed service core guarantees infrastructural stability at the unit scale; the load-bearing party walls structure vertical growth and define clear property limits at the cluster scale; and the courtyard system creates a buffer zone between public and private that absorbs horizontal additions at both the unit and the cluster scale. The result is a dwelling that can grow from approximately 40 m² to 110–120 m² or more over thirty years while maintaining light, ventilation, structural integrity, and legible public-private gradients at all stages of growth.

Candilis, Josic & Woods present partial versions of all three principles: two integrated courtyards that provide light and ventilation but are not dimensioned as growth reserves (P1 partial); long parallel structural walls with pre-cast tie-beams that guide longitudinal expansion but do not define clear lateral property boundaries (P2 partial); and a narrow service bay that stabilizes wet infrastructure but also contains sleeping rooms, reducing its spatial leverage (P3 partial). The result is a proposal capable of substantial documented horizontal growth but limited in vertical expansion: as upper-floor rooms fill the bays, the courtyards compress without a minimum-dimension guarantee, progressively undermining ventilation to lower rooms — a pattern confirmed by post-occupancy documentation (García-Huidobro et al. 2005, 2010; Lucas Alonso, 2015).

Kikutake, Kurokawa & Maki, and **Herbert Ohl** do not share any of the three principles in a form that is accessible to non-professional builders, for the reasons explained in Section 3.

The five higher-performing proposals span four national contexts (Switzerland, United Kingdom, Spain, Colombia, Peru), a distribution that is not incidental: it suggests that the three principles are not culturally specific but arise wherever designers engage seriously with the physical logic of incremental growth. Atelier 5's mat derives from Swiss modernism; Stirling's L-plan from British post-war housing; Íñiguez de Ozoño's courtyard from Spanish vernacular tradition; Samper's patio from Andean-Colombian housing culture; Miró-Quesada's et al. bay-and-courtyard system from Peruvian modernism's own engagement with pre-Columbian spatial organization. The convergence is morphological rather than stylistic.

4.2 PREVI in Comparative Perspective: Belapur and Elemental

Having established the three-principle taxonomy through cross-case analysis, the discussion now examines its broader applicability by comparing PREVI with two later incremental housing projects.

Belapur (Correa, 1983–1986) represents the most systematically successful instantiation of the cluster growth. Correa's use of the seven-unit cluster as a growth-regulating device at the intermediate scale constitutes a spatial achievement that several PREVI proposals — particularly Atelier 5, Stirling, and the Colombian team — approached from different geometric angles but did not fully resolve. All four understood that the cluster geometry is not merely an aggregation device but a growth-regulating mechanism: by defining the maximum extent to which each individual unit can expand before impinging on a neighbor, the cluster structure coordinates individual and collective growth simultaneously. This is the difference between a seed-dwelling *system* and a seed-dwelling *unit* (Mendes et al., 2013; Setti, 2022). The hierarchy of courtyards at three scales — private unit court, shared cluster court, neighborhood court — mirrors the spatial logic of the best PREVI proposals, notably the Samper team's multi-scalar courtyard organization, which Correa may have known, given his participation also in the same competition.

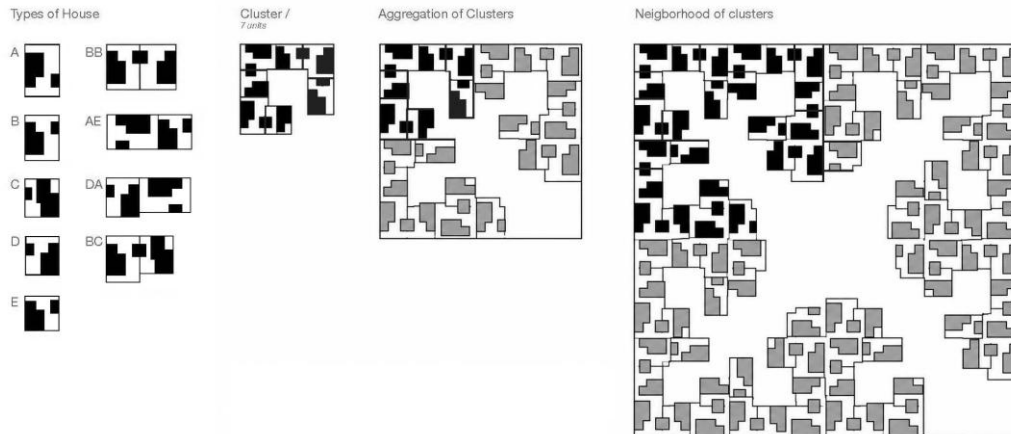


Figure 6. Belapur Incremental Housing (Charles Correa, New Bombay, 1983-86): seven-unit cluster plan and incremental growth sequence. (Source: Author's diagram based on Steinø et al. (2020)).

The **Elemental** projects (Quinta Monroy, 2003; Villa Verde, 2010) represent a deliberate return to PREVI's questions in a contemporary Chilean context. The 'half-house' strategy — delivering the structurally complex half and leaving the 'easy half' for residents — is a direct descendant of the seed-dwelling logic. Where Elemental improved on PREVI's less successful proposals was in the clarity of the growth logic: the structural frame, the fixed service core, and the open half-unit were legible enough that 92 of 93 households at Quinta Monroy expanded within twelve years (Carrasco & O'Brien, 2021). Where Elemental fell short of the highest-performing PREVI proposals was in the absence of the courtyard buffer: the linear building form, while maximizing the open growth zone, did not provide the multi-directional light and air protection that the courtyard offers, and produced the progressive deterioration of shared open space documented by Carrasco and O'Brien (2022) and Granja Bastidas and Cuenca Gonzaga (2020). Villa Verde partially addresses this by providing a more generous lot depth and rear garden, but the courtyard principle is still not structurally encoded as in Atelier 5, Samper, or Miró-Quesada.



Figure 7. Quinta Monroy, Iquique, Chile (Elemental, 2003): original half-house state (left) and resident-expanded state at 12 years (right). (Source: Tadeuz Jalocha (original) / Cristobal Palma (expanded)).

A further point of comparison concerns the interface between the dwelling cluster and the public street. **Candilis-Josic-Woods'** front-courtyard configuration and **Stirling's** street-facing elevation both anticipate the future insertion of ground-floor commercial uses as the cluster matures economically. Post-occupancy records confirm that ground floors in both these proposals were converted to small shops and workshops more frequently than in proposals with more enclosed street-facing typologies (Land, 2015; García-Huidobro et al., 2010). This programmatic adaptability — the seed dwelling growing not only in size but in use — prefigures the mixed-use incrementalism now recognized by researchers such as Martínez Muñoz and Maroto (2024) as essential to the long-term economic viability of informal

urban settlements. The **Miró-Quesada, Núñez & Williams** proposal similarly provided for commercial insertion at the front of the lot, consistent with the mixed-use character of Lima's residential streets (Land, 2015).

The broader pattern emerging from this comparison suggests that the three principles are not equally critical at all scales of urbanization. The fixed service core is universally critical: its absence frustrates growth regardless of any other design decision. The load-bearing party wall is critical for vertical growth specifically and for defining property limits at the cluster scale. The interior courtyard becomes increasingly important as cluster density rises: it is less critical for two-storey, low-density configurations and becomes decisive at mid-rise densities where horizontal growth is constrained, and vertical growth must be managed without light loss.

Table 2 summarizes the comparative legacy of PREVI's best-performing spatial principles in Belapur and the Elemental cases.

Table 2. PREVI's Spatial Legacy in Belapur and Elemental (Sources: Mendes et al. (2013); Setti (2022); O'Brien et al. (2020); Carrasco & O'Brien (2021, 2022); Land (2015); García-Huidobro et al. (2005, 2010)).

Principle / Criterion	PREVI (best cases)	Belapur (Correa, 1983–86)	Quinta Monroy (Elemental, 2003)	Villa Verde (Elemental, 2010)
Interior courtyard	Yes (Atelier 5, Stirling, Samper, Miró-Quesada, Íñiguez)	Yes (3-scale hierarchy)	No (linear yard)	Partial (rear garden)
Load-bearing party walls perp. to street	Yes (all high-performing)	Yes	Yes	Yes
Fixed service core	Yes (all high-performing)	Yes	Yes	Yes
Cluster as growth regulator	Partial (Atelier 5, Stirling)	Yes (7-unit cluster)	No	Partial
Mixed-use interface	Yes (Stirling, Candilis, Miró-Quesada)	Partial	Partial	Partial
Expansion rate documented	High (Atelier 5, Íñiguez, Samper, Miró-Quesada)	High (20-year surveys)	92/93 Households in 12 years	High
Collective space quality at full buildout	Maintained (courtyard proposals)	Maintained	Degraded	Moderate

4.3 Economic Dimension: The Cost-Benefit Case for Incremental Housing

Beyond its spatial logic, incremental housing also presents a compelling economic argument, one that the PREVI experience illustrates particularly clearly. The fundamental premise is simple: in a contractor-built house, more than half of the total cost is labor. When owner-occupiers supply that labor themselves — or when the architectural system enables them to do so in stages aligned with their income trajectory — the end cost of the finished unit is dramatically reduced (Land, 2015).

At PREVI, the self-help component of some proposals demonstrated that units could be completed at material cost alone, with market values substantially exceeding construction cost once finished, generating immediate equity for low-income households who could not otherwise access mortgage finance (Land, 2015). The equity-building dimension is not peripheral to the economic argument: it is its core. A family that invests labor in their home over five to ten years does not merely obtain shelter — it accumulates an asset whose value grows as the neighborhood consolidates and services improve (Gyger, 2013; Kahatt, 2017).

The comparative economic logic of the three-principle framework operates at three levels. First, a fixed service core reduces the single largest hidden cost of incremental expansion: plumbing relocation. Across PREVI, proposals where residents had to relocate wet infrastructure to accommodate a new room showed significantly lower and slower expansion rates, and a higher proportion of improvised, structurally inadequate additions (Lucas Alonso, 2015). Second, load-bearing party walls dimensioned for a second storey eliminate the cost of structural reinforcement at the moment of vertical extension — typically one of the most expensive single items in informal self-building, particularly in seismic zones. At Quinta Monroy, Elemental's structural pre-provision reduced the cost of a full second-storey addition by an estimated 30–40% compared to unguided self-building, because residents did not need to hire structural engineers or pour new foundations (Carrasco & O'Brien, 2021). Third, a dimensioned courtyard reduces long-term operating costs

by maintaining natural ventilation and daylighting at all stages of growth, reducing dependence on mechanical systems that low-income households cannot reliably maintain.

The scalability argument is equally important. Programs that require significant professional oversight at every stage of construction are inherently limited in reach. The PREVI proposals that used construction systems replicable by residents — Miró-Quesada's small-panel steel formwork, Íñiguez de Ozoño's standard block system, Samper's reinforced brick — generated a form of construction literacy in the resident population: skills that were retained and transmitted within neighborhoods, reducing dependency on professional contractors for subsequent expansions (Land, 2015). The Ohl and Kikutake-Kurokawa-Maki proposals, by contrast, generated no transferable building skills, making each expansion episode as expensive and logistically complex as initial construction. Contemporary incremental housing research from Bangladesh (Alam, 2025), Indonesia (Viriezky et al., 2025), and Chile (Carrasco & O'Brien, 2021, 2022) consistently confirms that the full-buildout cost per square meter over a ten to twenty year horizon favors well-designed seed dwellings over either conventional complete delivery or unguided core housing.

4.4 Theoretical Implications: Housing as Temporal Infrastructure

The economic argument, however, is inseparable from a deeper theoretical one about the nature of the dwelling itself. The conventional model of mass housing production treats the dwelling as a commodity object: designed to a standard, produced at scale, delivered complete, and then consumed. This model is rooted in a specific temporality: the moment of completion is the moment of maximum value, and all subsequent change is degradation. The seed dwelling inverts this temporality. Its moment of delivery is not completion but inauguration: the dwelling is most fully itself not when the last tile is laid but when the first resident-driven addition demonstrates that the growth logic encoded in its structure has been understood and activated.

This reframing situates incremental housing within a broader theoretical shift identified by several recent scholars as the transition from housing-as-product to housing-as-process (Paulichen, Leite, & Pina, 2020; De Paris et al., 2023). It also connects to debates in infrastructure theory: infrastructure, unlike a building, is defined not by its terminal form but by its capacity to enable subsequent actions (Alam, 2025). The seed dwelling is housing as infrastructure in this precise sense: a system whose value is measured not by what it is at delivery but by what it enables over time.

This argument marks a clear distance from the Global North tradition of housing flexibility, which has predominantly addressed adaptability as an internal problem of floor plan reconfiguration within a fixed envelope (De Paris et al., 2023; Friedman, 2025; Yenice Yildiz & Atay, 2025). Northern European and North American flexible housing research — from the Netherlands' open building experiments at Molenvliet (van der Werf, 2025) to the life-cycle homes literature (Friedman, 2025) — focuses on changing room configurations within a structure that remains constant. The seed-dwelling model addresses a different problem: the vertical and horizontal growth of the built envelope itself, driven by households whose resource trajectories are non-linear, intermittent, and fundamentally different from the salaried middle-class households that anchor most Global North flexibility research.

The analysis supports and extends the open building tradition in two ways. First, it demonstrates that the support-infill distinction must be supplemented by a recognition that the initial infill in a seed dwelling already encodes the grammar of subsequent infills. Second, it shifts attention from the technical systems that enable flexibility to the morphological forms that structure it: the courtyard, the party wall, and the fixed core are spatial types with deep roots in vernacular and traditional housing across climate zones. Several high-performing PREVI proposals — particularly Íñiguez de Ozoño & Vázquez de Castro, Samper et al., and Miró-Quesada et al. — were explicitly informed by traditional Mediterranean, Andean-Colombian, and pre-Columbian courtyard dwelling forms. The Metabolist proposals, by contrast, drew on technological systems with no vernacular precedent in Peru, which partly explains their poor performance in the local self-build economy.

5. Conclusions

The cross-case analysis of eight PREVI proposals confirms that the simultaneous presence of an interior courtyard, load-bearing party walls perpendicular to the street, and a fixed service core consistently distinguishes seed dwellings that enable systematic growth from those that merely tolerate it. The proposals with the highest post-occupancy performance — Atelier 5, Íñiguez de Ozoño & Vázquez de Castro, Stirling, Samper, Esguerra, Sáenz & Urdaneta, and Miró-Quesada, Núñez & Williams — share all three principles; those with the lowest performance — Kikutake-Kurokawa-Maki and Ohl — share none. Candilis, Josic & Woods, with all three principles partially present, occupy an intermediate position that the framework explains clearly: the partial versions are enough to enable significant horizontal growth but not enough to support full vertical expansion, confirming that it is not just the presence of the three principles but their complete operational clarity that leads to high performance. Taken together, these findings confirm that PREVI was not a uniform project; rather, its proposals vary substantially in their incremental performance, and this variation is largely explained by the presence or absence of the three principles identified here.

The study offers two original contributions that are directly relevant to contemporary architecture, housing design, and urban sustainability. The first is theoretical: it introduces a design taxonomy—the three-principle seed-dwelling model—that operationalizes a distinction that has not previously been clearly defined in the field. Previous research on incremental housing, including Habraken's open building theory, the post-occupancy studies by García-Huidobro et al. (2005, 2010), and the morphological research by Alegría & Dovey (2024) and Martínez Muñoz & Maroto (2024),

shows that growth occurs across various nested spatial scales. It also indicates that design choices influence this growth. However, it does not specify which particular spatial elements are essential and sufficient for ensuring successful, resident-driven development. This paper addresses that gap. The difference between a seed dwelling and a merely incomplete house is designable, nameable, and teachable: it resides in the simultaneous presence of a spatial growth reserve (principle 1), a structural growth framework (principle 2), and an infrastructural growth anchor (principle 3). This taxonomy advances Habraken's open building framework by showing that structure and initial infill must be spatially integrated from the beginning for the growth process to be not only feasible but also spatially guided by form—a practical tool for architects and housing designers working in rapidly urbanizing contexts. It also situates incremental housing within the broader theoretical shift that recent scholars have identified as the transition from housing-as-product to housing-as-process (Paulichen, Leite & Pina, 2020; De Paris et al., 2023), and connects it to debates in infrastructure theory, where infrastructure is defined not by its final form but by its capacity to enable subsequent actions (Alam, 2025). In this sense, the seed dwelling is housing as infrastructure: its value lies not in what it delivers at completion but in what it enables over the following decades.

The second contribution is empirical: the study recovers and systematically analyzes two proposals that have received significantly less scholarly attention than the more well-known European entries — Samper-Esguerra-Sáenz & Urdaneta and Miró-Quesada-Núñez & Williams. The Colombian and Peruvian proposals are more than just additions to the archive of known PREVI cases. They demonstrate that the three principles are not the product of a single architectural tradition: the Swiss mat (Atelier 5), the British L-patio (Stirling), the Spanish courtyard typology (Íñiguez de Ozoño), the Andean-Colombian patio house (Samper), and the Peruvian bay-and-courtyard system (Miró-Quesada) all arrive at the same spatial logic through different genealogies. This convergence confirms the morphological rather than stylistic character of the three principles and substantially strengthens the cross-cultural robustness of the taxonomy. The inclusion of Ohl as an unsuccessful case is equally important: a proposal that did not succeed because its growth logic conflicted with the material and human realities of the construction environment, rather than due to a lack of architectural ambition. This serves as a lesson that remains directly relevant to modern incremental housing efforts, which often depend too heavily on technical systems that non-professional builders cannot access, as confirmed by recent studies in Indonesia (Viriezky et al., 2025) and Bangladesh (Alam, 2025).

The comparative cases of Belapur and Elemental confirm that the three principles operate across different cultural and climatic contexts, while revealing the conditions under which each becomes most critical. The fixed service core is universally decisive: its absence frustrates growth regardless of any other design decision. The structural pre-provision embedded in the load-bearing party wall reduced expansion costs substantially at Quinta Monroy (Carrasco & O'Brien, 2021), an economic benefit that conventional delivery models cannot replicate. As density increases and horizontal expansion is limited, the interior courtyard becomes ever more vital, especially at mid-rise levels where vertical development must be balanced without sacrificing light. Belapur's hierarchy of courts at three scales — private unit court, shared cluster court, neighborhood court — represents the most systematically resolved instantiation of this logic and illustrates the difference between a seed-dwelling unit and a seed-dwelling system. The economic case reinforces the spatial one: as demonstrated in Section 4.3, proposals that embedded replicable construction systems generated construction literacy within resident communities, reducing expansion costs over the full buildout horizon and building household equity that conventional delivery models cannot offer (Land, 2015; Carrasco & O'Brien, 2021).

The principal strength of this analysis lies in its cross-case, principle-based framework, which makes it possible to identify design decisions that remain invisible when proposals are examined separately or described only in historical and stylistic terms. The inductive analytical process—analyzing each case individually before making comparisons—prevents forcing a fixed classification and ensures that the three-principle taxonomy appears as a genuine finding rather than just a hypothesis supported by selective reading. The inclusion of unsuccessful cases (Ohl, Kikutake-Kurokawa-Maki) is essential to this logic: a taxonomy that only describes success cannot claim predictive value.

The principal limitation of the study is its reliance on secondary documentation rather than new fieldwork, and the uneven depth of the post-occupancy record across proposals. The Stirling scheme, for example, has received far less dedicated scholarly attention than Atelier 5, so assessments of its long-term performance rely more on broader PREVI documentation than on focused case-study evidence. Post-occupancy outcomes are influenced by management frameworks, tenure arrangements, and macroeconomic factors that cannot be completely isolated through purely design-based analysis. The three-principle taxonomy is derived inductively from eight cases within a single competition context; its generalizability to other regions and construction cultures remains to be tested. Three research directions follow directly from these limitations. A comprehensive post-occupancy survey of all remaining PREVI units, especially focusing on the Samper and Miró-Quesada blocks, would provide quantitative evidence to evaluate the interpretive claims presented here. A comparative morphological analysis extending the framework to Southeast Asia, sub-Saharan Africa, and the Middle East would assess cross-cultural validity and identify the conditions under which adaptation is required. And research into developing modern seed-dwelling prototypes—integrating the three principles within current constraints of seismic safety, low-carbon materials, and digital fabrication—would turn the historical lessons of PREVI into practical design knowledge for practitioners and policymakers working on the global housing deficit today.

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Institutional Review Board Statement

Not applicable. This study did not involve human participants or animals and did not require ethical approval.

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Conceptualization; Methodology; Investigation; Formal analysis; Writing of original draft; Writing of review & editing. All authors have read and approved the final manuscript.

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