DOCTORAL RESEARCH PROPOSAL

ENABLING TYPOLOGIES

The Invisible Integration of Assistive Technology in Housing for Older Adults

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Research Project Summary

The starting point is empirical: aging-related assistance faces recurring refusal as soon as it becomes visible. This rejection does not stem from a lack of understanding, but from the way the technical object reconfigures space and self-image. This research shifts the question toward architectural morphology by observing what the existing built stock already enables through its constructive plasticity. By crossing the capabilities framework (Sen) and ontological security (Giddens), the hypothesis is that certain thicknesses of the built fabric — interstitial voids — can integrate assistance without altering the phenomenological integrity of the dwelling or compromising the occupant's ontological security.

The method relies on Research by Design, structured by a diagnostic tool: the "Atlas of Thicknesses" ($1/10^{\text{th}}$-scale sections). The primary corpus, centered on the Parisian apartment building, is articulated with a comparative Istanbul corpus to test the transferability of these thickness regimes.

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1 Origin of the Research Question

This research originates in renovation projects conducted in the historic housing stock of Paris and Istanbul, in direct engagement with aging households. Field observations indicate that prescribing assistive devices alone is insufficient. The principal challenge emerges in the everyday interaction between changing bodily capacities and a largely fixed architectural environment — particularly thresholds, narrow circulation paths, and support surfaces.

A recurrent pattern is observed: once assistance becomes visually explicit, it is discussed, relocated, and frequently abandoned. The difficulty is therefore not primarily technological but spatial.

Alarm pendants are left unused in drawers, and connected cameras are disconnected after short periods of use. Such responses do not indicate technical incomprehension; rather, they reflect a clear perception that visible devices can transform domestic space into a site of surveillance and alter the occupant's social identity.

These observations align with existing scholarship: when space is marked by visible symbols of dependency, occupants tend to distance themselves from the device. This reaction protects domestic dignity and confirms that the issue is architectural and semantic as much as functional. Padgett (2007) provides a key conceptual frame for this phenomenon. However, this frame remains insufficiently integrated into routine housing-adaptation practice, revealing a significant gap between theory and implementation.

In both France and Turkey, public policy often treats adaptation in old buildings as a sequence of additive corrections. In practice, this approach is constrained by the physical logic of existing stock — limited thicknesses, irregular service networks, and hard-to-modify partition systems. The resulting trajectory is frequently similar: temporary improvisation, fragile acceptance, eventual withdrawal, and in some cases forced relocation.

Housing stabilizes routines and supports orientation over time. Giddens (1991) conceptualizes this as ontological security, while Dupuis and Thorns (1998) identify continuity, anchoring, intimacy, and control as its core dimensions. Visible medicalization can disrupt this structure of meaning; the sanctuary descends into clinical sterility, and the occupant is recast as a patient.

Accordingly, the central research question is reformulated as follows: to what extent can buildings, through their material configuration and interstitial voids, integrate technical assistance discreetly while preserving ontological security?

Current scholarship often separates ergonomics, gerontology, and architecture. This project addresses that separation by integrating these fields at the level where adaptation is materially decided: the inner workings of the building envelope and its constructive thickness.

To address this objective, the thesis develops a structured conceptual framework organized around three interrelated pillars, introduced here and developed in detail in Section 2.

The first pillar is constructive plasticity, defined as the capacity of existing structures to accommodate incremental modifications — for example, routing conduits, concealing sensors, or adapting baseboard systems — without compromising load-bearing integrity or domestic spatial organization.

Architectural literature has not yet systematically linked analysis of constructive interstices to aging and assistive integration. Addressing this omission constitutes a central contribution of the present research.

This hypothesis must be empirically tested. The Atlas of Thicknesses is therefore used to distinguish presumed voids from truly mobilizable voids by combining geometric measurement, continuity analysis, and intervention constraints.

These "thicknesses" include latent zones beneath parquet, behind paneling, and within former service shafts. Although generally absent from conventional plans, they may provide technically viable locations for low-visibility integration. The Atlas, based on $1/10^{\text{th}}$-scale sectional analysis, is designed to evaluate this potential systematically.
Within this framework, Enabling Typology is defined as a residential configuration capable of integrating essential assistive equipment within its constructive layers under existing normative conditions. Its objective is to reinforce capabilities (in Sen's sense) without producing visible stigmatization in domestic space.
Such an objective requires fine-grained sectional analysis. The thesis therefore examines the interaction between age-related bodily change and material roughness, drawing on Rowles (1978) and Wahl, Fänge, Oswald, Gitlin, and Iwarsson (2009), and translates these insights into operational categories tested through $1/10^{\text{th}}$-scale survey work.

2 Theoretical Landmarks: From Doctrine to Sectional Drawing

This section establishes an integrated framework linking sociological theory, philosophical inquiry, and architectural representation. References are treated as operational concepts rather than rhetorical devices: capabilities and ontological security define normative aims, while plasticity and interstitiality define material constraints. Grounded in field observation, this framework is designed to address recurrent spatial impasses that remain under-specified in conventional architectural analysis.

2.1 From Sen's Capabilities to Material Thickness

Translating Sen's framework (1999) into constructive analysis requires a scalar shift. Sen distinguishes achieved functionings from real capabilities. Applied to housing (Nussbaum, 2011), this distinction implies that domestic value lies less in the presence of equipment than in the autonomy effectively enabled by spatial conditions.
This perspective has direct implications at the level of constructive detail. A three-centimeter threshold or a slippery tile finish can materially restrict capability. Such elements are therefore not minor technical inconveniences but concrete mechanisms of exclusion. The building's thicknesses should be evaluated as potential media of discreet support rather than neutral technical residues.
Some researchers have identified this dynamic (Van Dijk et al., 2021). Yet they stop at the threshold of the physical structure. This is precisely where the borrowing from constructive ergonomics — and from the notion of an "enabling environment" (Falzon, 2013) — becomes decisive in transferring capability from the human body to the brick envelope around it.
This theoretical construction nevertheless requires empirical verification. The Atlas of Thicknesses serves this function by shifting from plan to section in order to test whether interstitial material margins can support emancipatory use conditions.

2.2 Ontological Security: Silent Anchoring

Ontological security may be defined as the ability to inhabit without continuously reinterpreting the surrounding environment: a practical trust anchored in stable spatial cues.
Giddens's approach (1991) goes beyond the mere question of physical safety to address the security of being itself — that silent pact binding us to the permanence of things and structuring our relation to inhabited space. For an older person aging within their own walls, this certainty takes embodied form: the precise creak of the floorboards; the resistance of a door handle worn

by years; that raking beam of light sweeping the living-room wall at exactly four o'clock. To dismiss such details would be an analytical mistake. They are the moorings of an identity woven into plaster over decades.

Dupuis and Thorns (1998) set the terms around four pillars: continuity, anchoring, intimacy, and control. The visible introduction of an optical eye or alert beacon on the ceiling immediately weakens the intimate grammar of the place. Refuge fades; the clinic takes over. The inhabitant becomes a patient. Padgett (2007) dissected this mechanism at the margins of extreme vulnerability. The conclusion is clear: domestic space either protects or erodes ontological security.

The operational hypothesis is as follows: latent integration of technology within wall and floor assemblies can preserve embodied spatial memory more effectively than visibly medicalized devices, provided that corpus-specific normative and usage constraints are explicitly accounted for.

2.3 Constructive Plasticity: Elasticity Under Constraint

Constructive plasticity is defined here as the combined physical and legal capacity of a building to accommodate new service networks without destabilizing its load-bearing structure or compromising spatial organization.

Stewart Brand's analysis (1994) shows that buildings do not adapt uniformly. High-plasticity zones are often found beneath timber floors or within disused flues, whereas reinforced-concrete slabs provide substantially less tolerance. Cardoso and colleagues (2019) identified these margins in the Parisian fabric: 4 to 6 cm voids beneath joists and former 15×15 cm shafts running from cellar to attic.

Physical feasibility alone, however, is not sufficient. Co-ownership rules, heritage oversight (Architectes des Bâtiments de France), and conservation-oriented planning frameworks can neutralize otherwise viable interventions. The Atlas therefore records only mobilizable plasticity, defined at the intersection of technical possibility and legal authorization.

Although adaptability is a long-established concept, its treatment at the execution scale under real construction constraints remains underdeveloped in the literature.

Reversibility remains a core condition. Making assistance discreet does not imply irreversible embedding. Integration must remain compatible with maintenance, failure management, and eventual removal through dry-removable baseboards, identifiable floor boards, and discreet access hatches. This principle is encoded in the Matter layer (score M, where M = Matter, N = Norm, P = Phenomenology) of the Atlas.

2.4 Architecture's Overlooked Dimension: The Power of Void

The term "thickness" remains under-theorized in architectural research. It refers to interstitial pockets embedded between constructive layers. Standard plans tend to omit these spaces, although they often determine whether discreet integration is feasible.

Semper (1860) and Frampton (1995) provide the operative framework: buildings are layered systems of structure, infill, and envelope rather than monolithic solids. The resulting voids, rarely visible in archival plans, become legible in section. Tracking thickness therefore reactivates practical margins for low-visibility integration.

Thickness is not only a measurement; it is a relational condition. A 5 cm void under a floor is operational only if the device fits, routing remains continuous, and co-ownership rules authorize intervention. Physical measurement, legal regime, and phenomenological impact are inseparable. This triad corresponds to the three layers of each Atlas sheet.

The reading proceeds across scales: macro (courtyard, ground-floor interface, riser), meso (cellar, attic, suspended ceiling), and micro (joist, joint, foot-to-baseboard contact; Pallasmaa, 2024). Haptic continuity is primarily decided at this final scale.

2.5 Birth of an Enabling Typology

Enabling Typology is defined as a residential configuration in which walls and floors can absorb assistive equipment while preserving domestic integrity. It is treated here as a point of convergence where three major theoretical lineages intersect.

First comes Semper's garment logic (1860) — the famous Bekleidung. The frame keeps the building standing, while the surface carries meaning. Within this framework, assistance is positioned beneath protective thickness rather than exposed at surface level. This schema is used heuristically to orient architectural interpretation without substituting for engineering validation.

This textile analogy also clarifies a historical shift. Twentieth-century mass housing often reduced interstitial "folds" in favor of compact concrete assemblies. In the context of aging, recovering an Enabling Typology implies reintroducing controlled material margins within the building envelope.

Then comes the gradient of intimacies (Eleb & Debarre, 1995). From entrance threshold to bedroom, the house manages privacy with strict precision. The intrusion of an optical lens dislocates this refinement. Material embedding restores the hierarchy.

Finally comes haptic primacy (Pallasmaa, 2024). Space is first read by the pressure of footsteps and the brush of a shoulder, well before vision. As aging eyes lose sharpness, the body takes over. A floor that "senses" the resident's step, rather than filming from above, transforms intrusive surveillance into a benevolent resonance of matter.

The core hypothesis can therefore be stated as follows: Enabling Typology denotes a residential configuration that integrates assistance within constructive thickness under applicable normative regimes, preserves resident agency, and prioritizes haptic continuity over visual monitoring.

2.6 Body–Building Parallel

Bodily aging and material aging evolve in parallel. Both accumulate temporal traces that structure everyday orientation. Environmental gerontology has shown, since Rowles (1978), that older occupants develop highly refined embodied maps of domestic space. Adaptation strategies should therefore preserve, rather than disrupt, this embodied knowledge.

The hypothesis is that technical integration, when inscribed within the building's constructive thickness, does not destroy this embodied acuity — on the contrary, it may extend it.

2.7 Beyond the "Smart Home" Paradigm

This thesis proposes a critical alternative to the dominant smart-home model. Emerging from ubiquitous computing (Weiser, 1991), that approach often accumulates connected devices to compensate for age-related vulnerabilities. It frequently treats the building as a neutral container, overlooking material aging. Above all, it tends to make dependence materially legible. The resulting abandonment has been widely documented in the literature.

The proposed shift in perspective is straightforward. The principal question is not which device should be added, but which functions can be integrated by the building itself. In this formulation, the discretion imperative associated with calm technology (Weiser & Brown, 1996) is translated into constructive terms: invisibility is produced through sectional design rather than interface design alone.

2.8 The Sidewalk Test: The Ground-Floor Interface as Threshold

Autonomy does not stop at the apartment threshold. Thinking about aging in place by isolating the apartment is insufficient. Mobility is decided at the critical moment of the "first step outside." At this point, the ground-floor interface (street-level threshold, rez-de-ville) becomes decisive (Mangin & Boudjenane, 2023). It defines the spatial and social thickness between private and public spheres. The analysis is limited to the first fifty meters beyond the dwelling, where slope, seating, and local legibility directly condition everyday mobility.

2.9 The Enabling Continuum: From Baseboard to Pavement

This uninterrupted spatial chain is termed the "enabling continuum." Autonomy begins at the baseboard junction, crosses the landing, moves through the hall, and extends into the street, which remains a non-neutral environment.

The decisive test occurs at the threshold between building and street. In Paris, the strict alignment of Haussmannian facades produces a binary transition between entrance hall and sidewalk, leaving minimal social thickness at ground level. In Istanbul, the *ara sokak* combines stairs, informal seating, and mixed uses within the same micro-territory, generating both obstacles and support points. The Atlas of Thicknesses therefore extends beyond interior walls to the first fifty meters outside the dwelling, as this buffer zone strongly conditions long-term aging in place.

Extending the Enabling Index to exterior spaces shows that assistive invisibility must diffuse at neighborhood scale — not through hyper-medicalized zones, but through careful slope adjustment, tactile legibility of surfaces, and responsive lighting embedded in street furniture. Enabling Typology is not only a privilege of private housing; it can become an intrinsic quality of an urban fabric designed never to label its inhabitants.

3 Research Problem: Architecture as a Force of Concealment

Beyond catalogs of medical equipment and generic adaptation discourse, the central analytical issue is whether existing walls can function as active support systems for aging in place through materially discreet integration of assistance. The analysis contrasts two urban morphologies with distinct genealogies: the stratified Parisian apartment block and the Istanbul apartman housing fabric.

This central question unfolds into four interdependent research axes.

3.1 Tracking Thickness: The Geography of Voids

This axis examines whether the hidden anatomy of interstices can be anticipated from block form or parcel subdivision. It seeks to establish an analytical relationship — morphological rather than statistical — between urban form and the availability of interstitial voids. The aim is to convert archival plans into diagnostic tools and identify "deposits" — those centimeters capable of hosting assistance within the thickness of matter.

3.2 The Right to Cut Through: Regulatory Constraints

Material systems may be adaptable, but legal frameworks are often less flexible. Routing a wall chase or rerouting a technical shaft depends as much on legal authorization as on material resistance. In Paris, interventions face heritage protection and co-ownership rules. In Istanbul, seismic imperatives and the complexity of Kat Mülkiyeti define the limits. In many cases, the decisive barrier to aging in place is regulatory rather than material.

3.3 The Haptic Impasse: When Invisibility Becomes a Question

Material embedding alone may not guarantee phenomenological acceptability. Field evidence indicates the existence of a critical threshold at which a device remains experientially intrusive even when visually concealed. The perception of being instrumented can destabilize domestic atmosphere and weaken ontological security, raising the question of whether architectural integration can occur without reconfiguring the home as a quasi-clinical environment.

3.4 The Test of Coincidence

Analytical validity does not rest on declarative intent but on what is termed here the test of coincidence. The Atlas layers — Matter (M), Norm (N), and Phenomenology (P) — are superimposed to assess whether zones associated with higher ontological security coincide with voids that are both technically and legally mobilizable.

4 State of the Art: Four Disciplinary Silos, One Blind Spot

The literature review is situated at the intersection of four academic territories. The key finding is that these domains often examine related problems without sustained conceptual integration.

4.1 Environmental Gerontology: Space Without Materiality

Lawton's model remains analytically robust: when environmental demand exceeds occupant competence, functional range contracts. Three decades of environmental gerontology have refined, rather than displaced, this framework, and Wahl, Iwarsson, and Oswald (2012a) provide a precise account of its identity-related dimensions.

The central limitation is not empirical inaccuracy but excessive abstraction. In much of the literature, dwellings are reduced to geometric variables (clearance width, threshold height), while material texture, wear, and embodied familiarity remain under-theorized.

4.2 Assistive Technologies (AAL): Limits of Acceptability

A persistent tension in AAL literature is that adoption failures are repeatedly documented while new devices continue to be developed under similar assumptions. Across distinct studies (Peek et al., 2014; Laitinen et al., 2021; Meyer et al., 2022), the conclusion is consistent: resistance is often rooted not in ignorance, but in how devices are spatially and socially interpreted in everyday domestic settings.

Device placement is therefore a central variable. A visible unit installed in the center of a living room produces a markedly different domestic effect from an equivalent system embedded in a baseboard assembly. Frameworks centered on "perceived usefulness" and "ease of use" (Davis, 1989) do not adequately capture this spatial dimension, which is architectural as well as behavioral.

4.3 Morphology of Existing Stock: Primacy of the Plan

Research by Loyer, Eleb, and Pinon established a rigorous cartography of the Parisian apartment block. However, this analytical tradition has generally privileged planimetric organization over detailed sectional analysis, leaving interstitial constructive conditions comparatively underexamined.

This omission is not minor. Voids between Haussmannian joists, or legacy shafts that extend from cellar to attic without appearing in permit drawings, are often precisely the locations where low-visibility assistive integration becomes materially feasible.

A comparable blind spot is observed in Istanbul. While Çelik (1986) clarified large-scale urban transformation and recent studies (Yılmaz, Kılınç) have documented the internal logic of early twentieth-century apartman buildings, the specific question of adaptation to age-related bodily change remains only marginally addressed.

4.4 Model Transfers: A Comparative Morphology

Tanzimat reforms did not reproduce Paris on the Bosphorus. Although facade language and alignment principles were partially transferred, seismic risk and local economic constraints generated distinct constructive systems and hybrid "thickness regimes." The Paris-Istanbul comparison is therefore used to identify how transferred models are materially transformed under divergent pressures. The objective is diagnostic rather than genealogical: to compare material regimes rather than assert linear filiation.

4.5 Gap Synthesis: Interstitial Space

Taken together, the findings indicate that gerontology often abstracts from constructive structure, engineering underestimates symbolic burden, architectural history privileges plan over section, and comparative studies rarely address execution-scale interstitial conditions.

This cross-reading reveals a clear research gap. This doctoral project intervenes precisely in that interstice, which remains underexamined across established interpretive frameworks.

5 Corpus: Contrasting Two Urban Fabrics

Analyzing a building in isolation would be reductive. Aging in place does not stop at the apartment door: autonomy extends into, and is often decided within, transition spaces. The courtyard, shared circulation areas, and the thickness of the ground-floor interface (Mangin & Boudjenane, 2023) form the first transitional zone toward the outside. For this reason, the research expands its analytical focus from dwelling scale to block and street scale. To test this spatial continuity, the investigation relies on contrasting two asymmetrical yet complementary urban corpora.

5.1 Paris Axis: Material Stratigraphy (6 to 8 buildings, 1855–2000)

Paris provides the empirical foundation of this inquiry. Fieldwork concentrates on the 10th and 11th arrondissements to document the evolution of thicknesses across five major constructive sequences: Haussmannian fabric (1855–1870), transitional post-Haussmannian fabric (1870–1890), Belle Époque densification (1890–1910), early reinforced-concrete uses in the interwar period, and contemporary residential production (1990–2000).

A deliberate control point is added to this historical corpus: contemporary residential production (1990–2000). Analyzing recent stock, where structure and services are often merged, provides a

critical control test. The objective is not to seek hidden potential there, but to rigorously map the absence of interstitial voids. Documenting this condition demonstrates that plasticity is not an immutable architectural datum but a historically situated property — a margin progressively reduced by modern construction optimization. Parcel selection follows strict criteria: crossing periods, varying parcel morphology, and ensuring access to original co-ownership regulations through the Archives of Paris.

The choice of the 10th and 11th arrondissements rests on four operational criteria rather than practitioner familiarity. First: parcel density — these districts have a maximal concentration of rental apartment blocks in continuous fabric, enabling constructive-plasticity testing at block scale without historical-sequence interruption. Second: visible temporal stratification — the five selected constructive regimes coexist at street scale, sometimes within the same party-wall facade. Third: documentary density — 10th-district archives contain exceptionally complete co-ownership documentation for 1870–1930, enabling systematic Matter/Norm cross-reading. Fourth: the presence of contemporary buildings (1990–2000) within dense fabric — indispensable control cases of zero plasticity, without which comparison would lack a baseline.

5.2 Istanbul Counterpoint: Seismic and Regulatory Constraints (3 to 5 buildings, 1900–2020)

Istanbul is not introduced as illustration, but as a true test of transferability. The corpus relies on two distinct fabrics: Kadıköy, on the Asian side, characterized by mixed uses and density; and Nişantaşı, on the European side, marked by distant morphological kinship with Parisian fabric (Çelik, 1986; Bilsel, 2011).

In this terrain, both structural logic and regulatory rules change radically. Cut stone gives way to heterogeneous masonry and then reinforced concrete, under the dual imperative of seismic safety and condominium law (Kat Mülkiyeti). Analysis covers four typologies: pre-1920 masonry, early Republican concrete, the peak apartman period (1950–1960), and finally radical rebuilding imposed by Law 6306 (urban transformation). A dedicated Atlas sheet maps this brutal disappearance of interstices in favor of structural reinforcement.

The choice of Kadıköy and Nişantaşı follows a symmetric yet inverted logic. Kadıköy offers maximal constructive heterogeneity: late Ottoman masonry, early Republican concrete, 1950s apartman stock, and post-2012 reconstruction coexist within the same block. Nişantaşı provides the variable of morphological convergence with Paris: a distant lineage, sufficiently documented (Çelik, 1986; Bilsel, 2011) to be operational, yet sufficiently distant to avoid circular comparative reasoning. One tests plasticity under acute seismic pressure; the other tests it under the dual constraints of Kat Mülkiyeti and gentrification, which slows structural transformation.

5.3 Comparative Mechanics: Isolating the Adaptation Variable

The comparison is structured around four analytical variables. The matrix below isolates plasticity levers and context-specific constraints, allowing estimation of the relative contribution of architectural and legal parameters.

The Paris-Istanbul comparison serves a strictly analytical purpose. These two metropolises share an initial morphological kinship that diverged under contrasting constructive and legal constraints. This contrast isolates the key transferability question: whether Enabling Typology remains operative outside Haussmannian regularity when confronted with seismic pressure and fragmented legal regimes. The comparison reveals adaptation dynamics that a single-context monograph cannot capture.

Analytical variable	Paris (10th / 11th)	Istanbul (Kadıköy / Nişantaşı)	Impact on Enabling Typology
Structural shell	Load-bearing stone masonry, timber framing.	Hybrid masonry and post-1950 reinforced concrete frames.	Paris retains more cuttable second-work layers; Istanbul offers tighter intervention margins.
Interior fit-outs	Dry assembly (joists, lath-and-plaster suspended ceilings).	Wet integration (direct plaster on concrete, boxed-in shafts).	Parisian parquet assemblies retain exploitable void pockets; in Istanbul, usable voids are often limited to former ventilation shafts.
Regulatory constraints	ABF heritage controls, co-ownership rules, bioclimatic planning provisions.	Complex condominium regime, Law 6306 (seismic risk).	In Paris, legal authorization often limits intervention; in Istanbul, seismic compliance can reduce adaptive options.
Social dynamics	Aging in place, heritage-led gentrification.	Reconstruction-driven gentrification, fragmentation of older residents' landmarks.	The need for secure domestic continuity is shared, but conditions for discreet adaptation diverge strongly.

6 Hypotheses and Refutation Criteria

H1 — Primacy of invisibility: material integration of technology preserves the inhabitant's ontological security.

Refutation condition: this hypothesis is invalidated if anxiety about "latent surveillance" overrides visual comfort.

H2 — The Haussmannian paradox: Parisian floor assemblies contain exceptional plasticity that is frequently neutralized by legal constraints.

Refutation condition: this hypothesis is invalidated if surveys show that these plenums are materially unusable across the corpus.

H3 — Istanbul asymmetry: pre-1970 apartman stock displays a different plasticity regime, whose comparison with Paris allows estimation of the relative contribution of architectural and legal variables.

Refutation condition: this hypothesis is invalidated if seismic constraints and regulatory regimes render any interstitial intervention structurally inoperative in both corpora.

7 Methodology: Drawing as Cognitive Inquiry

The researcher-architect position requires explicit epistemological rigor. In this thesis, practice is not a simple illustrative support but an operational mode of inquiry. Research is therefore developed through drawing rather than before drawing.

7.1 The Epistemological Status of the Section Drawing

The $1/10^{\text{th}}$-scale section does not illustrate theory *a posteriori*; it engages the problem at its material root. Schön (1983) and Cross (2006) showed that knowledge emerges in the act of designing. Drawing the thickness of an old Istanbul shaft requires explicit testing of continuity, accessibility, and legal permissibility. The drawn line thus transforms practitioner intuition into a refutable scientific hypothesis.

7.2 The Thickness Atlas: Mapping the Interstice

The Atlas is a diagnostic tool structured around three inseparable layers:
— Matter (M): measured physical void, its continuity, and reversibility of access.
— Norm (N): legal status, co-ownership regulations, or heritage protection that governs it.
— Phenomenology (P): the impact of activating this void on the inhabitant's routine and intimacy.
The Enabling Index evaluates each interstice through the (M, N, P) triplet on a 0-to-2 scale, where score 0 documents a current constraint — physical, normative, or phenomenological — without removing the interstice from the corpus; zero is analytical data, not an exclusion verdict. Score 2 certifies mobilizable potential within the existing normative framework.
— Matter: M0 (documented constraint, absent or destructive void), M1 (limited continuity), M2 (accessible and reversible).
— Norm: N0 (documented constraint, blocked regime), N1 (heavy conditions), N2 (ordinary regime).
— Phenomenology: P0 (documented constraint, intimate rupture), P1 (partial compatibility), P2 (strong compatibility).

Profile (M:N:P)	**Diagnostic**	**Related hypothesis**
M2:N2:P2	Fully enabling interstice.	H1 supported
M2:N0:P2	Haussmannian paradox: physical potential blocked by regulations.	H2 illustrated
M0:N2:P2	Documented physical constraint: plasticity not mobilizable in its current state.	H2: no paradox (partial refutation)
M2:N2:P0	Phenomenological threshold crossed despite material invisibility.	H1 weakened (latent anxiety predominates)
M0:N0:P0	Documented void — control building (zero plasticity).	Zero reference: all hypotheses
M1:$\mathbf{N_x}$:$\mathbf{P_x}$	Intermediate case: partial potential, contextual qualification required.	H3: asymmetry to analyze

The inference rule linking (M, N, P) profiles to thesis hypotheses is made explicit in the decision table above. Each inventoried interstice receives a joint profile, then is classified into six diagnostic categories directly articulable with the refutation conditions of H1–H3.
Reading the table: profile M2 · N0 · P2 is the typical illustration of the Haussmannian Paradox (H2) — high physical plasticity, absolute regulatory blockage, and preserved phenomenological compatibility. The hypothesis is confirmed not by obtaining uniformly positive scores, but by systematically identifying the level of blockage and its origin (normative, physical, or phenomenological).

7.3 Phenomenological Assessment: Cross-Expert Evaluation

The protocol relies on cross-expert evaluation: spatial hypotheses identified in sections are submitted to a panel of gerontologists and occupational therapists, who validate or invalidate assignment of the P score based on actual home-care routines.

7.4 Critical Distance

Prolonged immersion in professional practice provides privileged field access. This is a methodological asset, but also a potential source of confirmation bias. To limit this risk, the protocol includes strict safeguards: incorporation of neutral buildings, external review of Istanbul cases by a Turkish research partner, and institutional supervision by IPRAUS.

The Atlas also has clear limits of action. The $1/10^{\text{th}}$-scale section does not directly modify legal frameworks. It does, however, document the gap between physical potential and effective mobilization when normative constraints intervene. In this sense, the Atlas functions not only as a research instrument but also as a visual decision-support tool for co-ownership actors and public-policy stakeholders.

8 Originality and Expected Scientific Contribution

The value of this research is measured not only by what it discovers, but by the tools it forges for reading existing stock. The project aims to contribute to architectural research on three distinct planes:

— A conceptual contribution (Enabling Typology): formalizing this notion makes it possible to articulate the capabilities approach (Sen, Nussbaum), ontological security (Giddens), Semper's Bekleidung framework, and haptic experience (Pallasmaa). The concept seeks to move beyond the sterile duality between stigmatizing medico-technical housing and frozen heritage housing.

— A methodological contribution (Atlas of Thicknesses): the Atlas is a reproducible investigation protocol (the M, N, P triplet) that other researchers can mobilize on other residential typologies.

— An epistemological contribution (critique of the additive paradigm): this research offers a documented challenge to technological solutionism ("smart home"), with the aim of reintroducing architectural sciences and spatial dimensions into the aging debate.

8.1 Scope and Conditions of Refutability

Defining a research project also means defining its boundaries. This thesis produces neither a technological prototype nor a universal economic model for mass renovation. The choice to study dense fabrics (Paris 10th/11th, Nişantaşı, Kadıköy) reflects a deliberate focus on historically valued ensembles. These are treated as analytically dense settings for testing, under favorable conditions, the morphological and normative feasibility of discreet integration before any extension to more heterogeneous fabrics.

Benchmarking is included as a refutability condition. Although the thesis does not test devices in situ, Atlas operativity relies on a rigorous technical reference frame. Dimensions of existing AAL technologies (2 mm flexible piezoelectric films, 5 mm flat wiring, 15 mm recessed modules) are used to verify the real capacity of thicknesses. The $1/10^{\text{th}}$-scale section therefore documents not an abstract void, but compatibility with specific technologies under structural constraints. This benchmarking ensures that (M, N, P) scores remain refutable evaluations.

Analytical box 1 — Haussmannian Paradox hypothesis: the Haussmannian block appears to be the most physically plastic residential type in the corpus (high M2 potential) because of

second-work voids. Yet it is also strongly constrained by layered co-ownership rules and heritage prescriptions (ABF). The central proposition is that the adaptation barrier is primarily legal rather than architectural. The combined score (M2, N0) would document frozen potential that could be released if institutional frameworks evolve.

Analytical box 2 — Istanbul double-constraint hypothesis: in Istanbul, constructive plasticity appears constrained by two strict normative regimes. Law 6306 (seismic risk), by prioritizing heavy reinforcement, may obstruct preexisting interstitial voids. Kat Mülkiyeti, through fragmented governance, makes intervention on shared elements highly complex. The Atlas is designed to analyze this tension, where immediate seismic urgency may neutralize long-term adaptability.

8.2 Projective Outlook: From Inherited Plasticity to Anticipated Plasticity

Although circumscribed to existing stock, this research has a direct implication for contemporary design: studying existing buildings helps define new requirements for future construction.

If old fabric still offers margins of maneuver today, this is largely due to inherited plasticity produced by dry-assembly techniques. By contrast, contemporary production, often driven by land-value optimization, tends to embed services directly into reinforced-concrete slabs. By fusing long-life structure with rapidly obsolete service systems, it risks freezing space and increasing visible medicalization under aging pressure.

Transposing Enabling Typology to new housing requires moving toward anticipated plasticity, where void is treated not as lost area but as a reserve of adaptability. This opening is formulated through three architectural-transfer hypotheses derived from Atlas observations:

1. Decoupling obsolescence cycles. Analysis of Haussmannian sheets indicates that interstitial abundance is found where second works retained autonomy from structure. Under dry-laid joists, 4 to 6 cm voids have remained operational for more than a century across multiple renovation cycles. For new construction, this suggests deliberate dissociation of layers with different life cycles — century-scale structure, decade-scale second works, and short-cycle assistive networks — rather than embedding them in a single concrete mass.

2. Shared vertical infrastructure. In several Istanbul cases, oversized 1950s apartman ventilation shafts now provide the only mobilizable vertical interstitial spaces within otherwise sealed buildings. Their residual plasticity was not intentional, but it demonstrates the strategic value of reserved vertical voids. For new construction, this implies designing, dimensioning, and governing such voids explicitly as infrastructure.

3. Re-semantization of the boundary. The baseboard is a frequently overlooked domestic boundary. In Haussmannian buildings, it often reaches 12 to 22 cm in height, is mechanically independent from the floor finish, and maintains perimeter continuity. The Atlas documents this recurrent configuration in pre-1914 Parisian cases: a continuous peripheral ring that is dry-accessible and reversible. This finding suggests that discreet integration often depends less on technological novelty than on precise reading of existing architectural intelligence.

The Atlas of Thicknesses is therefore not only a diagnostic tool for existing stock; it is also a methodological framework for prospectively questioning conditions of anticipated plasticity in contemporary design.

9 Institutional Anchoring and Scientific Supervision

This project is situated within UMR AUSser / IPRAUS in direct scientific coherence with the laboratory's research axes. The unit's historical expertise in urban morphology, evolution of residential typologies, and housing architecture in Paris provides a solid foundation for this research.

The laboratory's multidisciplinary approach provides a framework for scientific exchange suited to the project's methodological transversality — particularly the articulation between architectural form and legal housing regimes. IPRAUS's interest in model circulation and comparative urban history also allows coherent integration of the Istanbul component within its research axes.

This project is submitted under the supervision of Professor Corinne Jaquand, whose work on housing morphology and urban parcels (Bourillon & Jaquand, 2022) provides direct anchoring for this thesis's comparative investigations.

10 Material and Methodological Feasibility

The ambition of this project is supported by an organization designed to make delivery realistic over 36 months.

Material and logistical stability: ongoing professional practice supports the material conditions required for this research. In addition, Paris-Istanbul bi-residence is an established arrangement that facilitates planning and execution of field phases across both corpora without additional adaptation delay.

Field access: prior familiarity with Parisian and Istanbul housing stock facilitates access to buildings and co-ownership managers, generating significant time gains for survey initiation.

Scientific supervision framework: anchoring at IPRAUS under Professor Corinne Jaquand provides robust supervision. This guidance ensures methodological rigor and limits projective biases inherent to researcher-practitioner posture, securing sound theoretical and empirical development of the thesis.

11 Provisional Timeline (36 months)

The thesis is organized over 36 months, progressing from protocol construction to comparative testing and then to theoretical synthesis.

11.1 Year 1: Theoretical Framing and Paris Corpus (M1 to M12)

— Cross-disciplinary literature review (gerontology, morphology, AAL technologies).
— Documentary research (Archives of Paris, co-ownership regulations).
— Architectural surveys and production of the first Atlas sheets (Paris).
— Typological analysis and first expert evaluation of the protocol (M, N, P triplet).

11.2 Year 2: Comparative Sequence and Projective Hypotheses (M13 to M24)

— Research stays in Istanbul: surveys on the comparative corpus (Kadıköy, Nişantaşı).
— Comparative testing of normative frameworks (PLU/ABF vs Law 6306/Kat Mülkiyeti).
— Finalization of the Atlas of Thicknesses on both corpora.
— Development of first projective hypotheses (principles of anticipated plasticity for new buildings).
— Conference participation and drafting of a first peer-reviewed scientific article.

11.3 Year 3: Analytical Synthesis and Writing (M25 to M36)

— Cross-reading of data (triangulation with home-health experts).
— Theoretical consolidation of the Enabling Typology concept.
— Writing of the dissertation manuscript.
— Defense.

12 Indicative Bibliography

Indicative bibliography focused on references that are strictly operational for the thesis (approximately 50 titles). Foundational works are briefly commented to clarify their role in constructing the argument.

12.1 Commented Foundational Works

GIDDENS, A. (1991). — Modernity and Self-Identity. Cambridge: Polity Press. Provides the framework of ontological security.
SEN, A. (1999). — Development as Freedom. Oxford: Oxford University Press. Shifts analysis from “resources” to effective capabilities.
LAWTON, M.P. (1980). — Environment and Aging. Monterey: Brooks/Cole. Stabilizes the press/competence relationship.
BRAND, S. (1994). — How Buildings Learn. New York: Viking. Provides the shearing-layers model.
PALLASMAA, J. (2024). — The Eyes of the Skin (4th ed.). Chichester: Wiley. Structures the haptic argument.
SEMPER, G. (1860). — Der Stil in den technischen und tektonischen Künsten. Frankfurt am Main. Mobilizes Bekleidung as heuristic.
DUPUIS, A. & THORNS, D.C. (1998). — Home, home ownership and the search for ontological security. The Sociological Review, 46(1), 24–47.
ROWLES, G.D. (1978). — Prisoners of Space? Boulder: Westview Press. Legitimizes embodied knowledge of space.
SCHÖN, D.A. (1983). — The Reflective Practitioner. New York: Basic Books. Supports Research by Design.
MANGIN, D. & BOUDJENANE, S. (2023). — Rez-de-ville. Paris: Éditions de La Villette. Supports the methodological extension to the first fifty meters beyond the dwelling.

12.2 I. Urban Morphology, Model Transfers, and Constructive Plasticity

AFAD (2018). — Türkiye Bina Deprem Yönetmeliği. Ankara.
BALAMIR, M. (1992). — « Türk Apartman Konutunun Oluşumu ». Mimarlık, 30(247), 24–31.
BILSEL, C. (2011). — « Haussmann à Istanbul ». Histoire urbaine, 30, 51–78.
BOURILLON, F. & JAQUAND, C. (dir.) (2022). — L’Invention de la parcelle dans tous ses états. Rennes : PUR.
CARDOSO, R. et al. (2019). — « Structural and Material Characterization of a Haussmann Building ». WSEAS Transactions, 15, 171–180.
ÇELİK, Z. (1986). — The Remaking of Istanbul. Seattle : University of Washington Press.
ELEB, M. & DEBARRE, A. (1995). — L’Invention de l’habitation moderne. Paris : Hazan.
EPAURIF (2021). — Réhabilitation des immeubles haussmanniens de Paris. Paris : EPAURIF.
KILINÇ, K. (2023). — « Osmanlı Bürokrat Konutları ». Mimarlık Dergisi, 432, 34–41.

LOYER, F. (1987). — Paris XIXe siècle : l'immeuble et la rue. Paris : Hazan.
MAZOYER, H. (2019). — L'immeuble de rapport parisien (1850–1914). Thèse, ENSA Paris-Belleville / IPRAUS.
PINON, P. (2016). — Atlas du Paris haussmannien. Paris : Parigramme.
YILMAZ, E. (2023). — « Modernitenin Evi ». Kültür Araştırmaları Dergisi, 16, 88–107.

12.3 II. Ageing, Ageing in Place, and Environmental Gerontology

CARADEC, V. (2007). — « L'épreuve du grand âge ». Retraite et société, 52, 11–37.
DEMIR, Ö. (2022). — « Çevresel Gerontoloji Bağlamında Yerinde Yaşlanma ». Senex, 5(1), 45–62.
DEMIRKAN, H. & CİHANGİR, E. (2008). — « Housing for the Aging Population ». Environment and Behavior, 40(3), 382–398.
NUSSBAUM, M. (2011). — Creating Capabilities. Cambridge : Harvard University Press.
SIXSMITH, A. & SIXSMITH, J. (2008). — « Ageing in Place in the United Kingdom ». Ageing International, 32(3), 219–235.
VAN DIJK, H.M., CRAMM, J.M. & NIEBOER, A.P. (2021). — « Ageing in Place Processes ». BMC Public Health, 21, 417.
WAHL, H.-W., FÄNGE, A., OSWALD, F., GITLIN, L.N. & IWARSSON, S. (2009). — « The Home Environment and Disability-Related Outcomes in Aging Individuals ». The Gerontologist, 49(3), 355–367.
WAHL, H.-W. & OSWALD, F. (2010). — « Environmental Perspectives on Ageing ». In The SAGE Handbook. London : SAGE, 111–124.
WAHL, H.-W., IWARSSON, S. & OSWALD, F. (2012a). — « Aging Well and the Environment ». The Gerontologist, 52(3), 306–316.
WAHL, H.-W., OSWALD, F. & ZIMPRICH, D. (2012b). — « Aging in Place in Late Life : The Significance of Physical and Social Environments ». Journal of Aging Research, vol. 2012, article ID 655310. https://doi.org/10.1155/2012/655310.

12.4 III. Assistive Technologies (AAL) and Critique of the Additive Paradigm

DAVIS, F.D. (1989). — « Perceived Usefulness ». MIS Quarterly, 13(3), 319–340.
IENCA, M. & VAYENA, E. (2023). — « Mapping Ethical Issues in the Use of Smart Home Health Technologies ». BMC Medical Ethics, 24, 14.
LAITINEN, A. et al. (2021). — « Acceptance of Technologies for Aging in Place ». JMIR Aging, 4(1), e26224.
MEYER, S. et al. (2022). — « Analyzing Technology Acceptance and Perception of Privacy in AAL ». PLOS ONE, 17(7), e0269642.
PEEK, S.T.M. et al. (2014). — « Factors Influencing Acceptance of Technology for Aging in Place ». IJMI, 83(4), 235–248.
WEISER, M. (1991). — « The Computer for the 21st Century ». Scientific American, 265(3), 94–104.
WEISER, M. & BROWN, J.S. (1996). — « Designing Calm Technology ». PowerGrid Journal, 1(1).

12.5 IV. Epistemology, Qualitative Methods, and Public Policy

CROSS, N. (2006). — Designerly Ways of Knowing. London : Springer.
FALZON, P. (dir.) (2013). — Ergonomie constructive. Paris : Presses Universitaires de France.
FRAMPTON, K. (1995). — Studies in Tectonic Culture. Cambridge : MIT Press.
MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE (2021). — Stratégie nationale pour le logement des personnes âgées. Paris : La Documentation Française.
OECD (2019). — Health at a Glance : Long-term Care Resources. Paris : OECD Publishing.
RÉPUBLIQUE FRANÇAISE (2015). — Loi n°2015-1776 relative à l'adaptation de la société au vieillissement (ASV). JORF n°0301.
TÜRKİYE BÜYÜK MİLLET MECLİSİ (2012). — 6306 Sayılı Kanun. Ankara : TBMM.
WORLD HEALTH ORGANIZATION (2015). — World Report on Ageing and Health. Geneva : WHO.