

Re-Articulating the boundaries of architecture: From the ontology of architecture toward the spectrum of architectural disciplines

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ARTICLE INFO	ABSTRACT
<i>Article history:</i> Received January 24, 2026 Received in revised form Feb. 18, 2026 Accepted May 02, 2026 Available online June 01, 2026 <i>Keywords:</i> Architectural boundaries Architectural discipline Architectural ontology Cross-discipline Inhabited space Liminal area	<i>The development of contemporary architecture demonstrates an increasingly intensive degree of interdisciplinary intervention arising from environmental, technological, social, cultural, and artificial intelligence-related issues. Although this tendency is frequently understood as a form of progress, in practice it has generated a phenomenon of increasingly blurred architectural boundaries, in which dwelling space as the formal object of architecture is gradually displaced by external indicators such as technical performance, data, or symbolic representation. This research aims to reconceptualize the boundaries of architecture through a reaffirmation of the relationship between architectural ontology, disciplinary development, and interdisciplinary contribution. This study employs a theoretical-conceptual analytical method grounded in reconstructive synthesis of the thoughts of Aristotle, Vitruvius, Norberg-Schulz, Hillier, Broadbent, and Salura. The analysis is conducted progressively through three principal stages: the reaffirmation of architectural ontology, the formulation of disciplinary development, and the determination of the liminal domain as a testing zone for external contributions. Within this process, the Core Ontology of Architecture is operationalized through the concept of the Minimum Threshold of Spatial Structure (MTSS) as an ontological testing instrument for determining the minimum condition of inhabitable space. The findings indicate that the boundaries of architecture may be formulated as a layered structure consisting of: the Ontology of Architecture as the principle of embodied human dwelling within spatial configuration; the Core Ontology of Architecture as the minimum condition of inhabitable space; the MTSS as the minimum ontological threshold; the Core Discipline of Architecture as the mechanism for the physical realization of space; the Spectrum of Architectural Disciplines as the enrichment and expansion of dwelling; and the liminal domain as a testing zone for interdisciplinary contributions. This structure demonstrates that the boundaries of architecture are relational and hierarchical in nature, not rigid separations, but rather orientative mechanisms that maintain the ontological consistency of architecture amidst interdisciplinary openness. This research also positions the Architectural Property-Composition Epistemic Framework (APCEF/KEPKA) as an epistemic mechanism that ensures every architectural claim can be traced and verified through the relationships among spatial configuration, function, experience, and meaning. Accordingly, this study contributes to formulating the integration of ontology, ontological threshold, and epistemic mechanism in architecture as a coherent conceptual structure. Theoretically, this research reinforces the position of architecture as a discipline rooted in inhabitable space. Methodologically, it provides an orientative framework for evaluating the position of research and design practice within interdisciplinary contexts. These findings demonstrate that architecture does not lose its relevance because it possesses ontological boundaries; rather, it becomes vulnerable to weakening when such boundaries are neither recognized nor conceptually operationalized.</i>
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Introduction

Contemporary architectural development has been marked by the emergence of diverse practices and discourses that foreground striking labels such as *green architecture*, *sustainable architecture*, *smart building*, *smart city*, *digital architecture*, and even architecture based on artificial intelligence (Boarin and Martinez-Molina 2022; Kim et al. 2022). The advancement of artificial intelligence has also generated more fundamental questions regarding the position of architecture as a discipline. As spatial configurations increasingly become producible through automated computational processes based on data and optimization, architecture gradually risks being understood merely as a matter of spatial information processing. Under such conditions, the question of architectural ontology becomes increasingly significant: is architecture still understood as the space of human dwelling, or has it shifted into a system for producing configurations detached from the very experience of inhabitation itself?

These labels are generally promoted as evidence of architecture's progress in responding to global issues, technological development, and the complexity of contemporary social conditions (Semjén and Szép 2025; Y. Li et al. 2025). In many cases, such interdisciplinary approaches indeed open opportunities for methodological and thematic enrichment within architecture (C. Li et al. 2025; Jang, Roh, and Lee 2025).

Nevertheless, behind this tendency emerges a phenomenon that warrants conceptual criticism. In numerous practices and discourses, architecture tends to be reduced to a medium, instrument, or vessel for implementing the agendas of other disciplines, while the orientation toward inhabitable space as the essence of architecture becomes increasingly obscured. Criteria for architectural success are often displaced from the quality of inhabitable space toward external indicators derived from other disciplines, such as energy performance, system efficiency, behavioral data, or symbolic narratives that frequently stand independently. In this context, inhabitable space risks being positioned merely as a technical background, an operational system, or a representational meaning, rather than as a spatial entity that is inhabited and experienced (Alaily-Mattar et al. 2025; Kent et al.

2021). Under these circumstances, architecture no longer merely loses its form, but rather loses the very grounds of its justification as a discipline. The crisis that emerges is therefore not simply a transformation of approach, but a displacement of essence that obscures what may still legitimately be called architecture.

This phenomenon is not solely triggered by external interdisciplinary interventions, but is also reinforced by internal mechanisms within architectural education and research. In many educational institutions, the division of laboratories or specialized research groups into fields such as structures, building physics, urban studies, digital technology, and social studies was initially pedagogical and functional in nature (Patil et al. 2025; Sheoran and Panwar 2025). However, this division becomes problematic when each field develops relatively autonomously with its own material objects and analytical methods, without explicit orientation toward the formal object of architecture (Canakcioglu, Karadag, and Esgin 2024; Fahmy 2025). Under such conditions, inhabitable space no longer functions as the shared center of orientation, but instead tends to be displaced by concerns with technical systems, performance data, or autonomous social relations (Butt, Salama, and Rigoni 2025; Fakourian, Khakzand, and Hamzenejad 2025). A number of approaches have attempted to understand architecture through environmental, social, phenomenological, and configurational perspectives. Yet these approaches tend to operate partially and have not provided a conceptual framework capable of integrating ontological boundaries, disciplinary development, and interdisciplinary contribution within a single coherent structure.

This research does not proceed from the assumption that all architectural theories automatically converge toward a single uniform ontological structure. On the contrary, each theory is treated as a conceptual field possessing both potential correspondences and tensions in relation to the proposed framework. Accordingly, the synthesis undertaken in this study is not intended as a process of total unification, but rather as a mechanism of relational clarification for identifying intersections, boundaries, and possible incompatibilities among approaches. From this standpoint, the resulting framework is not understood as a closed system that negates difference, but as an orientative structure that

continues to leave room for criticism, revision, and further development.

This condition indicates the existence of a crisis in the boundaries of architecture, namely the blurring distinction between the ontological essence of architecture, internal disciplinary development, and interdisciplinary contribution. Architectural boundaries are often avoided because they are frequently perceived as restrictive, normative, or even accused of “closing off interdisciplinary possibilities” (Mitrovic 2011; Mitrović 2022). In fact, the absence of explicit boundaries risks causing architecture to lose its internal criteria for distinguishing what still belongs within the domain of architecture and what has shifted into the territory of other disciplines. Without ontological clarification, architecture potentially slips into becoming merely an applied branch of technology, social science, or policy, thereby losing its disciplinary autonomy (Salura and Clarissa 2024; 2025). In this research, architectural ontology is understood as the principle of embodied human dwelling within spatial configuration. This principle does not remain solely at the conceptual level, but requires operational derivation in the form of the minimum condition of inhabitable space, which in this study is formulated as the MTSS (Minimum Threshold of Spatial Structure), corresponding to the Minimum Necessary Spatial Structure (MNSS). From this perspective, the principal issue is not interdisciplinarity itself, but rather the absence of a conceptual framework capable of distinguishing between disciplinary enrichment that remains rooted in inhabitable space and forms of expansion that instead obscure the essence of architecture (Seamon 2023; Karim 2018; Salama and Patil 2024; Madan and Mathur 2025).

Based on these conditions, this research aims to propose a layered framework of architectural boundaries that systematically distinguishes among architectural ontology as the principle of human dwelling, the core ontology of architecture as the minimum condition of inhabitable space, architectural disciplinary development, and the liminal domain as a zone of conditional external contribution. The formulation of architectural boundaries in this study is not intended to restrict architectural development, but rather to provide an orientative structure through which every expansion remains grounded in the essence of architecture as inhabitable space. Through this approach, the research is expected to contribute to strengthening architectural ontology, maintaining

disciplinary consistency, and providing a reflective as well as operational framework for contemporary architectural practice, education, and research.

Within this context, the study also positions the Architectural Property–Composition Epistemic Framework (APCEF/KEPKA) as an epistemic mechanism that enables the relationships among space, function, experience, and meaning to be systematically traced. Accordingly, the architectural boundaries proposed in this research are not constructed solely at the ontological level, but are also complemented by an epistemic mechanism capable of examining the interrelationships among architectural elements.

Methods

Characteristics of the research object

This research does not depart from the study of a particular building case; rather, it originates from an epistemological problem concerning the boundaries of architecture as a discipline, as outlined in the introduction. Accordingly, the material object of this study is not a physical artifact, but a corpus of philosophical and architectural theories that historically and conceptually shape the understanding of what constitutes architecture as architecture. Meanwhile, the formal object of this research is architecture as inhabitable space, namely the manifestation of the ontological principle of human dwelling within spatial configuration (Pallasmaa 2011; Barosio et al. 2024).

The positioning of inhabitable space as the formal object is intended to maintain analytical consistency with the ontological claims established in the introduction, thereby preventing the discussion from becoming confined merely to thematic, methodological, or technical aspects. Within this framework, inhabitable space is understood not only as an empirical condition, but also as a minimum ontological structure, which in this research is operationalized through the concept of the Minimum Threshold of Spatial Structure (MTSS) as the equivalent of the Minimum Necessary Spatial Structure (MNSS). Consequently, all theoretical materials analyzed in this study are not treated as freely equivalent discourses, but rather as conceptual testing grounds whose contributions are assessed

according to their capacity to explain, reinforce, or obscure the ontological boundaries of architecture.

Criteria for the Selection of theoretical materials

The selection of theories in this research is based on four principal criteria directly derived from the research problem and objectives.

First, the selected theories must explicitly or implicitly address the essence of the existence of architecture, rather than merely discussing technical aspects, stylistic tendencies, or specific themes. This criterion is necessary to ensure that the analysis remains grounded in the ontological domain, as emphasized in the introduction.

Second, the selected theories must possess historical and conceptual significance in shaping the understanding of architecture as a discipline, whether within philosophical traditions, classical architectural theory, or contemporary architectural thought. In this way, the analyzed theories can be justified as fundamental references for interpreting the boundaries of architecture, rather than as reflections of temporary methodological trends.

Third, the selected theories must enable a clear distinction between the formal object and the material object of architecture. This criterion directly relates to the central issue of the study, namely the blurring of architectural boundaries caused by the displacement of focus from inhabitable space toward external indicators. Therefore, theories incapable of explaining the relationship between spatial configuration and human dwelling are not positioned as primary foundations within the synthesis.

Fourth, the selected theories represent the diversity of architectural paradigms, ranging from philosophy and interpretivist approaches to rational and quantitative approaches. Such diversity is necessary to ensure that the resulting formulation of architectural boundaries is not biased toward a single paradigm, but instead emerges from a synthesis across traditions of thought while remaining grounded in the formal object of architecture.

Theoretical Materials Employed

Based on these criteria, this study employs several principal groups of theories as analytical materials, which collectively establish the foundation for the proposed ontological and epistemic synthesis.

First, Aristotle's theory of the four causes is employed as a philosophical foundation for understanding the ontological structure of architectural existence. This framework enables a distinction between objects, buildings, and architecture as inhabitable space by emphasizing the roles of *formal cause* and *final cause* as determinants of the ontological status of architecture, while *efficient cause* is understood as the domain of disciplinary development (Stein 2020; 2023; Tuozzo 2011).

Second, the thought of Vitruvius, particularly in *De Architectura*, is employed to reinterpret the origins of architectural praxis as humanity's effort to create spaces for living. This reinterpretation seeks to avoid simplistic reductions of the trilogy *firmitas–utilitas–venustas*, while repositioning it within the framework of human dwelling as the ontological basis of architecture (Morgan 1914; Bianco 2023; Rowland 2021).

Third, Norberg-Schulz's concept of the *building task* is utilized to represent the interpretivist paradigm that positions architecture as an existential task of constructing meaningful spaces for human beings. Within this research, the concept is reread in relation to inhabitable space as the formal object of architecture, such that meaning is not detached from spatial configuration (Norberg-Schulz 1965; Sicovic 2023; Biliūnas 2023).

Fourth, Hillier's notion of *architecture as a discipline* is employed to affirm the existence of an internal architectural logic that can be systematically and quantitatively analyzed. Within this research framework, the configurational approach is examined to determine the extent to which it remains grounded in the structure of inhabitable space rather than becoming detached as an autonomous analytical system (B. Hillier and Leaman 1976; Bill Hillier et al. 1984; Yamu, van Nes, and Garau 2021; Vaughan, Peponis, and Dalton 2025).

Fifth, Broadbent's concept of the *deep structure of architecture* is employed to understand the latent structures underlying the diversity of architectural expressions. This concept assists in explaining how structure, construction, and building systems possess ontological proximity to inhabitable space without becoming the ultimate end of architecture itself (Broadbent 1973; 1980).

Sixth, Salura's framework of the five classifications of architectural knowledge and the concept of the basic meaning of architecture

(*purpose–function–use*) is employed as a conceptual instrument for conducting cross-theoretical synthesis. This framework enables systematic distinctions among the formal object of architecture, the layers of medium, material object, and expression, thereby ensuring that the integration of various theories remains within the ontological boundaries of architecture (Salura 2015; Salura and Clarissa 2024; 2025).

Through this arrangement of theoretical materials, the study does not merely compile theories, but rather constructs an analytical field that enables the consistent examination of architectural boundaries at ontological, disciplinary, and interdisciplinary levels.

Methodological approach

This research employs a theoretical–conceptual analytical method grounded in synthesis, as derived from the research problem and objectives outlined in the introduction. The method aims to analyze fundamental theories as the material object of the study, extract key concepts related to the essence and boundaries of architecture, and reorganize them into a coherent conceptual framework.

Through this approach, the research does not merely collect and compare theories, but rather generates a conceptual framework functioning as a mechanism for systematically examining the ontological boundaries of architecture. Accordingly, the method is not comparative in the conventional sense, but reconstructive in nature, with the aim of rebuilding the conceptual structure of architecture both ontologically and epistemically.

The synthesis undertaken in this study is not intended to produce universal laws, but to formulate an orientative structure that is ontologically consistent and epistemically accountable. This approach is chosen because the issue of architectural boundaries cannot be adequately addressed solely through empirical measurement, but requires conceptual clarification concerning the formal object of architecture and the legitimacy of its disciplinary development. In this research, such conceptual clarification is carried out by positioning architectural ontology as the starting point of analysis, which is subsequently traced through its manifestation in inhabitable space and its development within architectural disciplines. Thus, the method directly operationalizes the study's central claim: namely, that the boundaries

of architecture can only be understood through the relationship among ontology, disciplinary development, and interdisciplinary contribution.

Research analytical procedures

The analytical method employed in this study is divided into several principal stages that are hierarchical and causal in nature. The sequence of these stages follows the ontological structure of architecture itself and therefore cannot be interchanged. Each stage produces conceptual criteria used to examine and formulate the boundaries of architecture systematically.

First stage: The affirmation of the core ontology of architecture

The first stage aims to clarify the ontological foundation of architectural existence by addressing the most fundamental question: why does architecture exist, and what makes it architecture?

At this stage, a conceptual analysis is conducted on theories directly concerned with the essence of architectural existence, particularly through the distinction between the formal object and the material object. This analysis results in the formulation of architectural ontology as the principle of embodied human dwelling within spatial configuration, which subsequently manifests as the core ontology of architecture understood as the minimum condition of inhabitable space.

In this research, this minimum condition is operationalized through the concept of the Minimum Threshold of Spatial Structure (MTSS), corresponding to the Minimum Necessary Spatial Structure (MNSS). MTSS refers to the minimum ontological threshold that must be fulfilled for a physical–spatial configuration to still be recognized as inhabitable space.

Within this study, MTSS is not positioned as an absolute definition of architecture, but rather as a heuristic-operational instrument intended to assist in identifying the minimum conditions of dwelling relationally. Consequently, MTSS does not function as a binary classification system that rigidly separates architecture from non-architecture, but as an evaluative mechanism that enables graduated interpretations concerning the degree to which a physical–spatial configuration remains connected to the principle of human dwelling.

This threshold encompasses not only the existence of minimum enclosing elements, but also the integration of spatial relations that allow for orientation, protection, and the basic use of space by the human body.

Accordingly, MTSS functions not merely as a definition of minimum conditions, but as an ontological testing instrument that enables the determination of whether a physical-spatial configuration still belongs to the realm of architecture or has shifted into another domain. This core ontology simultaneously serves as the conceptual anchor for all subsequent analyses.

Second stage: Architecture as internal disciplinary development

The second stage aims to explain how architecture develops upon its core ontology as a legitimate disciplinary field. At this stage, theories addressing architecture as discipline, method, and internal logic are analyzed, with particular emphasis on the ways inhabitable space is physically realized, qualitatively enhanced, and spatially expanded without replacing its formal object.

Through this stage, the disciplinary development of architecture is understood at two principal levels. First, the Core Discipline of Architecture, namely the disciplines that directly enable inhabitable space to be physically realized through structure, construction, and building systems. Second, the Spectrum of Architectural Disciplines, namely disciplines concerned with the enrichment of spatial quality and the expansion of human dwelling into broader spatial fields, both internally and externally.

This distinction allows specialization and the division of fields of study to be understood as legitimate internal developments within architecture, insofar as they remain oriented toward inhabitable space as the formal object. Accordingly, disciplinary development is not interpreted as fragmentation, but rather as intensification and extensification that remain tied to their ontological foundations. Through this framework, disciplinary development can be critically assessed to determine whether it continues to reinforce the relationship of inhabitable space or instead begins to replace it with autonomous systems.

Third stage: Determining the liminal domain of architecture

The third stage aims to establish the boundary between architecture and other disciplines through the concept of the liminal domain. At this stage, contributions from other disciplines, such as digital technology, artificial intelligence, psychology, social sciences, culture, and language, are critically analyzed using criteria derived from the preceding ontological and disciplinary stages. Interdisciplinary contributions are positioned as architecturally legitimate only insofar as they can be shown to affect inhabitable space while still fulfilling the minimum ontological threshold formulated through MTSS.

Accordingly, not every form of knowledge concerning human beings, behavior, environment, or technology automatically becomes architecture. A contribution may only be considered architecturally relevant when such knowledge can be explicitly translated into physical-spatial configurations affecting human dwelling. In this position, the liminal domain does not function as a zone of unrestricted claims, but rather as a mechanism of epistemic selection concerning the spatial relevance of external contributions. External contributions are therefore evaluated not according to their disciplinary origin or methodological approach, but according to their relationship to inhabitable space as the formal object of architecture.

Within this framework, the liminal domain is understood as an epistemic testing zone rather than a territory of automatic claims, thereby enabling architecture to remain open to external interventions without losing its ontological consistency.

Methodological synthesis

The entirety of these analytical stages is synthesized to produce a formulation of layered architectural boundaries consisting of architectural ontology as the principle of human dwelling, the core ontology of architecture as the minimum condition of inhabitable space, the development of core disciplines and the spectrum of architectural disciplines, and the liminal domain as a zone of conditional external contribution.

Within this structure, the core ontology of architecture establishes the minimum condition, MTSS ensures its threshold of existence, while disciplinary development and the liminal domain are examined according to their consistency with that threshold. Accordingly, the boundaries of

architecture are not understood as rigid dividing lines, but rather as relational structures that enable architecture to develop openly while remaining directed.

This synthesis affirms that the boundaries of architecture are not instruments of restriction, but orientative mechanisms enabling architecture to develop critically, openly, and with epistemic responsibility.

Results and discussion

Step one: Architectural ontology and core architectural ontology

The position of step one within the research structure

The first step of this research focuses on establishing architectural ontology and core architectural ontology as the most fundamental range of boundaries in understanding architecture. This step addresses the most basic question within architectural scholarship, namely why architecture exists and what essentially distinguishes it from objects, buildings, or other systems.

In this study, Architectural Ontology (AO) is understood as the principle of the dwelling of embodied human beings within spatial configurations. This formulation is not intended as a final definition that closes off all possibilities of architecture, but rather as a minimum ontological orientation that preserves architecture's connection to human dwelling. Accordingly, this research does not reject the existence of experimental, symbolic, virtual, or speculative practices; instead, it situates them within a critical inquiry regarding the extent to which such practices still maintain a relationship with inhabited space as the central orientation of architecture.

This ontological principle affirms that architecture cannot be reduced merely to a physical object, but rather constitutes a condition that enables human beings to dwell, orient themselves, and sustain their lives through space. Within the context of this research, dwelling is not narrowly understood as domestic habitation, but as the minimum condition of human existence involving bodily orientation, basic protection, the possibility of spatial use, and existential relations with the environment. Thus, dwelling in this research is layered, ranging from biological and

minimal orientational dimensions to the possibility of social, symbolic, and cultural enrichment developing upon them. With this understanding, architecture is not primarily conceived as building, form, or technology, but rather as an ontological relation between the human body, the necessity of dwelling, and the spatial configuration that makes it possible.

This ontological principle is subsequently manifested within Core Architectural Ontology (CAO) as the minimum ontological condition that must be fulfilled for something to be recognized as architecture. CAO is not intended as a final definition or a representation of all architectural possibilities, but rather as a minimum ontological threshold that ensures architecture remains rooted in inhabited space. In this sense, CAO functions as a lower ontological threshold enabling a valid distinction between architecture and non-architecture without eliminating the diversity of expressions, typologies, or cultural contexts.

Within this research, this minimum ontological condition is not only understood conceptually but is also operationalized through the concept of the Minimum Threshold of Spatial Structure (MTSS) as the equivalent of the Minimum Necessary Spatial Structure (MNSS). MTSS refers to the minimum threshold that must be fulfilled for a physical-spatial configuration to still be recognized as inhabitable space. This threshold is not determined merely by the presence of enclosing elements such as floors, walls, and roofs, but by the integration of spatial relations enabling the human body to orient itself, obtain protection, and use space in a basic manner. Thus, MTSS does not function as a technical standard, but rather as an ontological threshold ensuring that the space produced genuinely fulfills the minimum conditions of dwelling.

Within this framework, CAO establishes the minimum conditions of architecture, while MTSS functions as a conceptual testing instrument to assess whether those minimum conditions are genuinely fulfilled. Through MTSS, the boundary between architecture and non-architecture can not only be theoretically understood but also operationally examined in the interpretation of spatial configurations. Therefore, Step One does not stop at the affirmation of ontological principles, but simultaneously prepares the operational foundation for all subsequent analyses.

Aristotle: architecture exists because of formal cause and final cause

The most fundamental ontological contribution within this first step derives from Aristotle's framework of the four causes. The analysis demonstrates that this framework provides the minimum structure necessary to distinguish the physical existence of objects from the ontological existence of architecture. Material cause explains what a building is made of, while efficient cause explains who or what brings it into existence. These two causes are sufficient to explain the existence of technical or constructive objects, yet they remain insufficient to explain architecture as an ontological entity.

Architecture becomes ontologically present when formal cause and final cause are simultaneously affirmed. Within the context of this research, formal cause is understood as the configuration of inhabitable space, whereas final cause is understood as human dwelling itself. Thus, architecture exists not merely because of material, technique, or construction processes, but because it presents space that enables human beings to dwell, orient themselves, and sustain their lives. Without the affirmation of these two causes, buildings lose their status as architecture and revert to being merely technical objects.

In relation to CAO and MTSS, Aristotle's thought provides the foundation for understanding that the minimum conditions of architecture cannot be determined solely through the presence of materials or construction processes, but must instead be determined through the presence or absence of space fulfilling the purpose of human dwelling. In this way, Aristotle provides the philosophical basis for determining the minimum ontological threshold of architecture.

Vitruvius: Architecture originates from the need to produce living space

The second contribution to the affirmation of core architectural ontology derives from a reinterpretation of Vitruvius' thought, particularly in Book One of *De Architectura*. The analysis demonstrates that the popular understanding of the triad *firmitas-utilitas-venustas* often obscures architectural ontology by treating it as a set of autonomous technical and aesthetic criteria.

However, in Vitruvius' initial exposition, architecture is discussed as a practice emerging from the human necessity to live, seek shelter, and

organize space. *Firmitas*, *utilitas*, and *venustas* are not introduced as autonomous goals of architecture, but rather as qualities that emerge after architecture fulfills its ontological task, namely presenting human living space. Accordingly, Vitruvius' contribution lies in the historical affirmation that architecture has, from the beginning, been rooted in the existential necessity of human beings for living space.

Within the framework of this research, this reinterpretation of Vitruvius reinforces the position of CAO as the boundary of architecture's origin, while simultaneously affirming that architectural quality can only be discussed after the minimum condition of living space has been fulfilled. At this point, MTSS becomes crucial because it helps distinguish between spaces that genuinely present minimum dwelling conditions and spaces that remain merely at the level of form or construction.

Norberg-Schulz: Building task as the ontological task of architecture

Christian Norberg-Schulz's conception of building task provides an important existential dimension in affirming architectural ontology. The analysis demonstrates that building task cannot merely be understood as the physical act of construction, but rather as the ontological task of producing space that enables human beings to establish existential relations with the world.

Within this framework, architecture is understood as the means through which human beings dwell, orient themselves, and give meaning to their existence through space. This concept clarifies that architecture does not begin with form, symbol, or expression, but with the task of producing inhabitable space that can be experienced and interpreted. Thus, Norberg-Schulz's contribution strengthens architectural ontology by affirming that inhabited space constitutes the ontological entity at the center of architecture as a discipline.

The relation between Norberg-Schulz's thought and CAO-MTSS lies in the emphasis that dwelling cannot sufficiently be understood merely as the physical existence of space, but also as the minimum orientational and existential condition enabling human beings genuinely to be in the world. Therefore, MTSS in this research is not narrowly interpreted as the completeness of enclosing elements, but rather as the minimum threshold of spatial structure enabling fundamental ontological dwelling.

Salura: The formal object of architecture and basic meaning as internal mechanism

A systematic contribution to this first step derives from Salura's framework concerning the five classifications of architectural scholarship and the concept of the basic meaning of architecture (purpose–function–use). The analysis demonstrates that the distinction between idea, formal object, medium, material object, and expression provides architecture with an internal mechanism that positions inhabited space as the central orientation of architectural scholarship, which cannot be replaced by technology, materiality, or symbolic narratives.

Within this framework, the formal object of architecture is understood as the human need for inhabitable space, while other layers, such as technical media, construction materials, and formal expression, function instrumentally. Thus, architecture is not determined by technology, style, or particular symbols, but by its capacity to produce inhabitable space.

Furthermore, the concept of basic meaning affirms that legitimate architectural meaning is always rooted in the purpose of dwelling (purpose), spatial function (function), and actual human use (use). These three aspects can only emerge when inhabitable space is physically realized and experientially accessible. Accordingly, this framework strengthens CAO not only at the philosophical level, but also as an operational mechanism within architectural scholarship that enables distinctions between the formal object of architecture and its supporting layers.

Within the context of this research, Salura's framework also clarifies the position of MTSS. If CAO establishes the minimum ontological condition, then MTSS can be understood as the minimum spatial articulation enabling architectural purpose–function–use to begin operating. In other words, MTSS becomes the testing point through which one may examine whether a spatial configuration still allows the emergence of architecture's basic meaning.

Hillier and Broadbent: CAO as the guardian of disciplinary identity

The thoughts of Bill Hillier and Geoffrey Broadbent provide an important contribution in demonstrating the role of core architectural ontology as the guardian of the identity of architecture as a discipline amid methodological

diversity. Hillier emphasizes architecture as a discipline possessing an internal logic that can be systematically analyzed, while Broadbent stresses the existence of deep structures underlying variations of architectural form and expression.

The analysis demonstrates that both approaches continue to require core architectural ontology as an ontological anchor. Without core ontology, quantitative approaches risk being reduced merely to system or data analysis, while qualitative approaches risk shifting into general design theory detached from architectural objects. Thus, core architectural ontology functions as the boundary that enables methodological diversity to remain within the domain of architecture as a discipline.

In relation to MTSS, the thoughts of Hillier and Broadbent reinforce the notion that spatial structures and configurational logic only become architecturally meaningful when grounded in the minimum threshold of dwelling. In other words, not every configuration can automatically be claimed as architecture; it must first pass the minimum ontological threshold enabling the space genuinely to become inhabitable.

Formulation of the Results and Discussion of Step One

Based on the synthesis of the above thoughts, the first step of this research produces three levels of ontological formulation.

First, Architectural Ontology is understood as the principle of the dwelling of embodied human beings within spatial configurations.

Second, Core Architectural Ontology is established as the minimum ontological condition formulated as follows: (1) the formal object of CAO is inhabitable space; (2) the minimum material object of CAO consists of basic enclosing elements enabling space to exist in protected form; and (3) the ontological purpose of CAO is to enable human dwelling in a functional, secure, and meaningful manner.

Third, this minimum ontological condition is operationalized through MTSS as the minimum ontological threshold enabling the examination of whether a physical–spatial configuration genuinely fulfills the requirements of inhabitable space.

Accordingly, AO explains the principle of dwelling as a general ontological condition, CAO establishes the concrete minimum threshold enabling something to be recognized as architecture, while MTSS provides the

operational mechanism to test the applicability of that threshold in spatial interpretation practices. Within this structure, AO provides the principal foundation, CAO establishes the minimum conditions, and MTSS ensures that these minimum conditions do not remain abstract definitions but may instead be used to evaluate whether an artifact genuinely remains within the domain of architecture.

Step two: The core discipline and the spectrum of architectural disciplines

The position of step two within the research structure

The second step of this research focuses on the discipline of architecture as a domain of internal development grounded in architectural ontology (AO), the core ontology of architecture (COA), and the minimum threshold operationalized through AMSS. If the first step explains why architecture exists and under what conditions something may be recognized as architecture, then the second step addresses the following question: how is architecture materialized, enriched, and expanded without losing its ontological essence?

Within this framework, the architectural discipline cannot be equated with ontology, yet neither can it be detached from it. Ontology establishes the principles of inhabitation and the minimum conditions of architecture, whereas the architectural discipline constitutes the mechanism through which these principles are materially realized, qualitatively enhanced, and extended in practice. In other words, if ontology answers the question “what is architecture?”, then discipline answers “how architecture operates in the world.

The clarification of architecture as an internal development mechanism becomes essential in order to avoid two extreme tendencies within contemporary architectural discourse. On the one hand, there is a tendency to freeze architecture within an overly static ontological definition, thereby reducing technical, constructive, and spatial developments into seemingly secondary derivatives. On the other hand, there is an opposite tendency to expand architecture excessively, such that any external issue, method, or theme can immediately be claimed as architecture without first examining its relation to inhabitable space.

Accordingly, this second step aims to formulate the structure of architectural discipline as a legitimate form of development, provided

that it remains rooted in inhabitable space as the formal object and does not exceed the minimum ontological threshold established through COA and tested through AMSS. In this context, AMSS functions not merely as an evaluative instrument at the level of ontological identification, but also as a reminder of the minimum boundary that every disciplinary development must not transgress. A development can only be considered part of the architectural discipline insofar as it continues to preserve, strengthen, or extend human inhabitation within spatial configurations.

Aristotle: Efficient Cause as the Foundation of Disciplinary Development

The initial contribution within this second step again refers to Aristotle’s framework of the four causes, particularly the efficient cause. If, in the first step, the formal cause and final cause determined the ontological existence of architecture, then in the second step the efficient cause opens the possibility for questioning how architecture is realized.

In this context, the efficient cause encompasses all methods, processes, and mechanisms that enable inhabitable space to emerge materially, including structural systems, construction methods, building technologies, design methodologies, and the organization of the design process. The analysis demonstrates that the efficient cause forms the basis for the emergence of architecture as an operational discipline governing the realization of architecture in the world.

Nevertheless, the position of the efficient cause remains instrumental and cannot replace the role of the formal cause and final cause. In other words, the architectural discipline enriches the ways architecture is realized, but it does not determine the essence of architecture itself. Once the efficient cause is positioned as the center of architectural definition, architecture risks being reduced to mere technique, system, or procedure. Therefore, Aristotle’s contribution in this second step emphasizes that the architectural discipline must always be understood as a development derived from ontology rather than a substitute for ontology.

In relation to AMSS, Aristotle’s thought clarifies that disciplinary development must not terminate at procedural efficiency or technological sophistication alone. Every mechanism of realization must still be tested against the fundamental question: does the result

continue to maintain the minimum threshold of inhabitable space? Thus, AMSS operates as an evaluative boundary for the work of the efficient cause: not every process of realization automatically produces architecture, but only those that preserve inhabitable space as their central concern.

Vitruvius: Discipline as the Refinement of Living Space

Although Vitruvius is more strongly interpreted within the context of the first step as affirming the origin of architecture from the need for living space, his thought nevertheless leaves an important trace within the second step. A reinterpretation of *firmitas–utilitas–venustas* demonstrates that once the minimum conditions of inhabitation are fulfilled, architecture does not stop at the mere existence of space, but advances toward the refinement of the quality of living space itself.

Within this context, *firmitas* may be understood as the basis for disciplines related to structure and construction; *utilitas* provides orientation toward function, use, and spatial comfort; while *venustas* indicates that architectural quality does not end at minimum adequacy, but also encompasses order, appropriateness, and experiential quality. Thus, Vitruvius' thought suggests that the architectural discipline constitutes the development of the quality of living space that has already ontologically emerged.

However, this interpretation must be carefully maintained so as not to fall back into a normative understanding that separates these three aspects from inhabitation itself. Within the framework of this research, *firmitas–utilitas–venustas* is interpreted not as a list of autonomous qualities, but rather as directions for disciplinary development that remain rooted in inhabitable space. At this point, AMSS once again functions as a locking mechanism: architectural quality only acquires disciplinary meaning insofar as it does not sever the minimum threshold of inhabitation established in the first step.

Hillier: Architectural Discipline as Internal Logic

Hillier's conception of *architecture as a discipline* provides a significant contribution toward understanding architectural discipline as a system of internal logic that distinguishes it from other disciplines. Hillier argues that architecture is not determined by external themes such as environment, technology, or social issues, but

rather by architecture's specific way of organizing and configuring space. Within the context of the second step, the analysis demonstrates that this internal logic can only be maintained insofar as the architectural discipline remains grounded in the core ontology of architecture (COA). Without such grounding, analytical approaches, including quantitative and configurational methods, risk being reduced into system or data analyses detached from inhabitable space. Accordingly, Hillier's contribution emphasizes that architectural discipline constitutes a legitimate layer of development, yet cannot stand autonomously. It must always remain bound to the formal object of architecture, namely inhabitable space. Within this framework, architectural discipline is not merely a collection of techniques, but rather a logical structure that enables space to be understood and organized specifically as architecture.

The role of AMSS within this relationship becomes increasingly explicit: AMSS is not only an initial threshold of identification, but also a filter for the development of internal logic. This means that a configurational structure or spatial analysis only acquires architectural meaning insofar as its results continue to preserve the minimum conditions of inhabitable space. In this way, AMSS prevents the internal logic of architecture from transforming into an abstract system disconnected from real inhabitation.

Broadbent: Deep structure and the deepest discipline of architecture

Broadbent's contribution regarding the deep structure of architecture enriches the understanding of the deepest disciplinary layer within architecture. Broadbent demonstrates that behind the diversity of forms and expressions, architecture possesses a profound conceptual structure governing the realization of space.

Within the context of the second step, the analysis positions structure, construction, and building systems as part of the deepest discipline of architecture, because without these aspects inhabitable space cannot physically emerge. In other words, the deepest discipline represents the domain in which architecture operates most closely to its ontological realization.

Nevertheless, the analysis also emphasizes that structure and construction are not the ultimate goals of architecture, but rather means for realizing inhabitable space. Therefore, despite their high ontological proximity to COA, the

deepest disciplines still remain within the realm of development rather than ontology itself. Broadbent's contribution helps clarify the boundary between structure as support for ontology and structure as the center of architectural definition.

In this context, AMSS functions as the threshold determining whether such deep structures genuinely produce inhabitable space or merely generate physical systems. Not every structural sophistication automatically possesses architectural value. Structure only acquires disciplinary meaning when it enables, preserves, or strengthens the minimum threshold of inhabitation.

Salura: Discipline as layers of medium and material object

Salura's framework of five classifications of architectural knowledge provides a systematic conceptual instrument for mapping architectural discipline as layered internal development. Within this framework, the layers of medium and material object become the principal domains of architectural discipline, encompassing structural systems, building technologies, lighting, ventilation, acoustics, materials, and the treatment of exterior space.

The analysis demonstrates that not all disciplinary aspects possess the same ontological proximity to the formal object of architecture. From this emerges the necessity to differentiate architectural disciplines into hierarchical ranges according to their degree of closeness to inhabitable space. Thus, specialization and the division of fields are not understood as fragmentation to be avoided, but rather as legitimate forms of internal development, provided that they remain oriented toward the formal object and do not replace it.

Salura's framework enables architectural disciplines to be systematically mapped without losing their ontological center. Here the role of AMSS is once again reinforced. If the formal object is inhabitable space, then all layers of medium and material object can only be regarded as part of the architectural discipline insofar as they continue to function toward maintaining or developing the minimum threshold of inhabitation. In other words, AMSS serves as a control point ensuring that medium and material layers do not transform into autonomous ends detached from inhabitable space.

Norberg-Schulz: Discipline as the enrichment of the building task

Norberg-Schulz once again contributes to clarifying the role of architectural discipline as the enrichment of the *building task*. Within this framework, architectural discipline enables architecture to respond to social, cultural, climatic, and technological contexts without altering its ontological essence.

Discipline functions as a bridge between core ontology and worldly reality, such that inhabitable space is not only physically present, but also relevant and meaningful within particular contexts. Consequently, disciplinary development does not constitute a departure from ontology, but rather the consequence of the need to realize inhabitable space contextually. The analysis demonstrates that architectural discipline is not responsible for creating meaning detached from space, but rather for enriching the quality of inhabitation through responsible spatial articulation. In this position, architectural discipline expands the possibilities of architecture without displacing its center.

In relation to AMSS, Norberg-Schulz's contribution demonstrates that contextual enrichment must not obscure minimum ontological conditions. Space may indeed be enriched existentially, symbolically, or culturally, yet such enrichment must still rest upon the minimum threshold that genuinely allows human beings to inhabit it.

formulation of the results and discussion of step two: The hierarchical spectrum of architectural discipline

Based on the synthesis of all the foregoing perspectives, the second step of this research formulates architectural discipline as a layered and hierarchical form of internal development. First, the Core Architectural Discipline (CAD) refers to disciplines that directly enable inhabitable space to be physically realized, such as structure, construction, and building systems. This discipline possesses the highest ontological proximity to COA and operates at the level of fundamental intensification, namely enabling space to materially exist.

Second, the Spectrum of Architectural Disciplines (SAD) refers to disciplines that manage the enrichment and extension of human inhabitation, whether through improving spatial quality or through extending inhabitation into broader spatial domains such as exterior spaces,

landscapes, and communal spaces. Within this structure, SAD encompasses two principal modes: advanced intensification through the enhancement of spatial experience, and extensification through the expansion of inhabitation into collective spatial realms.

To clarify its operational structure, this disciplinary spectrum may be understood through the following hierarchical range:

- (1) the deepest layer associated with the physical realization of inhabitable space;
- (2) the intermediate layer associated with the quality of spatial experience; and
- (3) the outermost layer associated with the extension of inhabitation into communal and public spaces.

These three layers remain within the architectural discipline because all of them remain oriented toward inhabitation, albeit with differing degrees of ontological connectedness. Thus, the spectrum of architectural disciplines should not be understood as the dissolution of boundaries, but rather as the ontological consequence of the expansion of human inhabitation from core space toward collective spatial fields.

Across this entire spectrum, AMSS continues to function as the minimum locking mechanism. This means that every intensification and extensification can only be regarded as architectural development insofar as it does not sever the minimum threshold that allows space to remain recognizable as inhabitable space. Accordingly, AMSS not only tests “whether something has become architecture,” but also “whether a disciplinary development still remains architecture.”

Discussion of step two

The discussion of the second step emphasizes that architectural discipline is not a substitute for core ontology, but rather a mechanism of development grounded upon it. By distinguishing discipline as a hierarchical spectrum, this research avoids two simultaneous reductions: the reduction of architecture into mere technique, and the dissolution of architecture into external themes without a center.

Within this framework, architectural discipline functions as the mechanism that enables architecture to develop openly while remaining directed. Disciplinary development can only be considered architecturally legitimate insofar as it remains oriented toward inhabitable space as the formal object and does not exceed the

minimum ontological threshold established within COA and tested through AMSS.

Vitruvius’ subtle trace within this step clarifies that architectural discipline is not merely concerned with the technical realization of architecture, but also with the refinement of the quality of living space. Meanwhile, the increasingly emphasized role of AMSS throughout the second step demonstrates that disciplinary development must not be evaluated solely according to technological sophistication or the breadth of its spectrum, but rather according to its consistency with minimum inhabitation.

Accordingly, this second step establishes a stronger conceptual foundation for the third step, namely the examination of interdisciplinary contributions through the concept of the liminal region, which will determine the extent to which architecture may remain open without losing its ontological identity.

Step three: The liminal territory of architecture as a mechanism of epistemic evaluation

The position of step three within the research structure

The third step constitutes the concluding phase within the analytical structure of this research, functioning to determine how architecture relates to other disciplines in a controlled and accountable manner. If the first step established the Ontology of Architecture (OA) and the Core Ontology of Architecture (OIA) as the foundations of architectural existence, and the second step formulated architectural discipline as an internal development through the Core Architectural Discipline (DIA) and the Spectrum of Architectural Disciplines (DSA), then the third step addresses a more critical question: how can architecture remain open to external contributions without losing its ontological identity?

Within this context, architectural openness cannot be understood as limitless expansion. Every external contribution, whether originating from technology, environmental studies, social sciences, culture, psychology, or artificial intelligence, must be evaluated against the formal object of architecture, namely inhabited space. Therefore, the third step is not intended to expand the boundaries of architecture indiscriminately, but rather to formulate an evaluative mechanism through which interdisciplinary contributions may be assessed architecturally.

Departing from this necessity, the present research formulates the concept of the liminal territory of architecture, not as a loose gray zone, but as a structured evaluative zone. This territory can only be properly understood when connected to the findings of the first and second steps, namely architecture's ontology as foundation and architectural discipline as its internal development.

Aristotle: The liminal as incomplete relations among the causes

The initial contribution in this third step once again refers to Aristotle's framework of the four causes, but with emphasis on the tensions among them. If, in the first step, formal cause and final cause determined the ontological essence of architecture, and in the second step efficient cause opened the possibility for mechanisms of realization, then the third step reveals conditions in which the four causes fail to operate integrally.

The analysis demonstrates that the liminal territory emerges when an external contribution operates only within certain causes without achieving full integration. For example, technological approaches may function merely within efficient cause, or social approaches may emphasize only final cause, without being embodied within formal cause as spatial configuration.

Under such conditions, these contributions cannot yet be considered architecture, because they fail to fulfill the ontological unity required by the four causes. Nevertheless, these contributions are not entirely outside architecture, because they still possess the potential for integration.

Accordingly, the liminal territory may be understood as a condition of incomplete causal relations. It exists at the threshold: it may become architecture when the four causes are integrated, yet it remains outside architecture when confined to only one causal dimension. Within this context, AMSS functions as a concrete evaluative point that determines whether such integration genuinely produces inhabited space.

Vitruvius: The Liminal as the failure to achieve the quality of living space

The trace of Vitruvian thought within the third step reveals that the liminal territory may also be understood as a condition in which architectural quality has not yet been fully achieved. If, in the second step, *firmitas-utilitas-venustas* were interpreted as directions of disciplinary

development, then in the third step these principles may be employed as indicators to determine whether an external contribution has genuinely become part of architecture.

The analysis shows that many contemporary approaches stop at only one of these aspects. For instance, technology may strengthen *firmitas* without producing a usable inhabited space, while symbolic narratives may emphasize *venustas* without generating real inhabited space. Under such conditions, these contributions remain within the liminal territory.

Thus, the liminal territory may be understood as a condition in which the quality of living space has not yet been fully realized, despite the existence of the potential to achieve it. Within this context, AMSS again functions as the minimum threshold: before discussing quality, space must first satisfy the basic conditions of inhabitation. Without this foundation, *firmitas-utilitas-venustas* lose their ontological basis.

Hillier: The liminal as disconnection from the internal logic of space

From Hillier's perspective, architecture is determined by the internal logic of spatial configuration. Therefore, external contributions may be tested through the question: do they contribute to spatial configuration or not?

The analysis demonstrates that the liminal territory emerges when an approach remains disconnected from this internal logic. Data-driven, simulation-based, or algorithmic approaches may generate extensive information, yet if such information is not translated into spatial configuration, then the contribution has not yet become architecture.

Conversely, when external contributions are capable of influencing the organization of space, for example through spatial relationships, circulation patterns, or spatial structures, they may enter into the domain of architectural discipline.

Within this relation, AMSS functions as the final evaluator: the resulting spatial configuration must still satisfy the minimum threshold of inhabitation. Thus, not every configuration automatically becomes architecture; it must continue to preserve the minimum conditions of inhabited space.

Broadbent: The liminal as disconnection from deep structure

Broadbent's concept of deep structure demonstrates that architecture possesses latent structures underlying formal variations. Within the context of the third step, the liminal territory emerges when external contributions fail to engage with this deep structure.

For example, visual or digital approaches may produce compelling forms, but without relation to profound spatial structures, such contributions remain merely superficial. They exist at the threshold but have not yet become architecture.

Conversely, when external contributions are capable of influencing deep structures for instance in the relationships among space, systems, and experience they may be accepted as part of architecture.

Within this context, AMSS ensures that these deep structures continue to produce real inhabited space rather than merely abstract systems or visual compositions.

Norberg-Schulz: The liminal as failure of translation into inhabited space

From the perspective of Norberg-Schulz, architecture constitutes a building task associated with human existence in the world. Therefore, external contributions may only be accepted when they can be translated into inhabited space.

The analysis demonstrates that the liminal territory emerges when this translation fails to occur. Many social, cultural, or psychological approaches remain at the level of conceptual understanding without being translated into real spatial configurations. Under such conditions, these contributions remain outside architecture.

Thus, the liminal territory may be understood as a failure of translation: from external knowledge into inhabited space. Within this context, AMSS once again becomes the evaluative instrument determining whether such translation genuinely produces the minimum conditions of inhabitation.

Salura: The liminal as a layer outside the formal object under conditions

Salura's framework of the five classifications of architectural knowledge provides the clearest position for understanding the liminal territory. Within this framework, the liminal territory exists outside the formal object of architecture, yet still possesses the potential to contribute indirectly.

The analysis demonstrates that the liminal territory does not belong to the formal object, medium, or material object of architecture. Rather, it constitutes an external layer that may enter architecture only under specific conditions, namely by contributing to inhabited space and without replacing the formal object with external indicators.

Accordingly, the liminal territory is not itself part of architecture, but rather a zone of selection that determines whether a contribution may enter architecture or not. Within this context, AMSS functions as the final threshold ensuring that contributions do not exceed the ontological limits of architecture.

Formulation of the results and discussion of step three: the liminal territory as a layered evaluative zone

Based on the synthesis of the preceding theoretical perspectives, the liminal territory of architecture is formulated as an epistemic evaluative zone situated outside architectural ontology and discipline, yet enabling external contributions to be assessed architecturally. This territory operates through three principal criteria.

First, external contributions must demonstrate traceable impacts upon the configuration of inhabited space. Second, such contributions must strengthen the quality of human inhabitation, whether in the use or experience of space. Third, these contributions must not replace the formal object of architecture with purely external indicators.

Furthermore, all contributions must continue to satisfy the minimum ontological threshold formulated through AMSS. Within this structure, AMSS functions as the final ontological lock ensuring that external contributions are not merely conceptually relevant, but also ontologically legitimate.

Thus, the liminal territory is not merely a boundary, but a layered evaluative mechanism ensuring that architectural openness remains directed and coherent.

Discussion of step three

The discussion of the third step confirms that the liminal territory is not a weakening of architecture, but rather a mechanism that maintains equilibrium between openness and ontological rigor. Through the existence of the liminal territory, architecture may receive

interdisciplinary contributions without losing its center.

Within this framework, interdisciplinarity is not understood as unlimited fusion, but as a selective process continually evaluated against inhabited space as architecture's formal object. Architectural openness is not measured by the breadth of adopted spectrums, but by consistency in preserving the relationship among the human body, space, and spatial configuration.

Accordingly, the liminal territory functions as a mechanism of epistemic selection ensuring that architecture continues to develop openly without being reduced into another discipline. It is not a territory of compromise, but rather a territory of evaluation that determines whether a contribution genuinely strengthens architecture or instead shifts it beyond its boundaries.

Final synthesis of steps 1–2–3

The synthesis of the three analytical steps demonstrates that the crisis of contemporary architecture is not merely caused by a lack of innovation, but by the absence of an explicit and operational structure of disciplinary boundaries. When ontology, discipline, and interdisciplinarity are not clearly distinguished, architecture loses its orientational center as inhabited space.

Through this research, the boundary of architecture is formulated as a layered structure whose components do not stand separately, but are hierarchically and operationally interconnected, namely: the Ontology of Architecture (OA), the Core Ontology of Architecture (OIA), the Minimum Threshold of Spatial Structure (AMSS), the Core Architectural Discipline (DIA), the Spectrum of Architectural Disciplines (DSA), and the Liminal Territory.

Within this structure, OA establishes the most fundamental principle of architecture as the inhabitation of embodied human beings within spatial configurations. This principle is concretized in OIA as the minimum condition enabling something to be recognized as architecture, namely the presence of inhabited space that can be used, oriented, and experienced by humans.

This minimum condition does not remain an abstract definition, but is operationalized through AMSS (Minimum Threshold of Spatial Structure) as a cross-level evaluative mechanism. AMSS functions as an ontological lock ensuring that every physical-spatial configuration genuinely fulfills the minimum requirements of inhabitation,

while simultaneously serving as an evaluative instrument for all disciplinary developments and interdisciplinary contributions.

Based on this foundation, architecture develops through two disciplinary layers. DIA (Core Architectural Discipline) operates in the direct realization of inhabited space through structure, construction, and building systems, thereby enabling architecture's ontological conditions to exist concretely. Meanwhile, DSA (Spectrum of Architectural Disciplines) manages the enrichment and expansion of inhabitation, both through the enhancement of spatial experience (intensification) and through extension into collective spatial domains (extensification).

Outside the structure of ontology and discipline, this research formulates the liminal territory as an epistemic evaluative zone for external contributions. This territory does not belong to architecture ontologically or disciplinarily, yet it enables knowledge from other disciplines to enter conditionally. A contribution may only be accepted as part of architecture when its impact upon inhabited space can be traced and when it continues to satisfy the minimum threshold established by AMSS.

Accordingly, the entire structure operates as an integrated system: OA provides the principle, OIA establishes the minimum condition, AMSS tests its validity, DIA realizes it physically, DSA develops it in terms of quality and scope, and the liminal territory filters external contributions to ensure their continued relation to inhabited space.

Within this framework, architectural development proceeds through two principal modes, namely intensification and extensification. Intensification refers to the deepening of the quality of inhabited space within the same ontological limits, whereas extensification refers to the expansion of inhabitation into collective spatial domains. Both modes remain within the boundaries of architecture so long as they do not exceed the minimum threshold maintained by AMSS.

Through this formulation, the boundary of architecture does not function as a restrictive instrument that closes possibilities, but rather as an orientational structure that preserves the direction of development. Architecture may develop openly, critically, and interdisciplinarily, yet still remain rooted in inhabited space as its formal object. Indeed, when this boundary is not articulated, architecture risks losing itself not

because it is too narrow, but because it dissolves excessively into other disciplines.

Therefore, within this research, the boundary of architecture is not understood as an absolute dividing line, but rather as an orientational structure ensuring that architectural development continues to possess a center of inhabitation that remains ontologically and epistemically accountable. In this position, architecture remains open to transformation without losing the capacity to recognize itself.

Integration of ontology and epistemology: The position of KEPKA within the structure of architectural boundaries

The formulation of architectural boundaries produced in this research is not only ontological and disciplinary, but also requires an epistemic mechanism ensuring that every architectural claim remains scientifically accountable. Within this context, the Core Ontology of Architecture (OIA) functions as the existential boundary establishing the minimum condition for architectural existence, while AMSS functions as the minimum ontological threshold ensuring that this condition can be tested. Meanwhile, KEPKA (Epistemic Framework of Architectural Property–Composition) functions as the epistemic mechanism that evaluates and traces the validity of architectural claims.

If OIA answers the question “when does something become architecture,” and AMSS ensures the operational minimum threshold for answering that question, then KEPKA answers the question “how is architecture read, analyzed, and proven as architecture.” Accordingly, OIA, AMSS, and KEPKA do not occupy substitutive positions, but rather complement one another across three distinct layers: ontological definition, ontological threshold, and epistemic verification.

The two modes of disciplinary development, intensification and extensification, not only explain the directions of architectural development, but also become objects of epistemic evaluation within the KEPKA framework. In this context, intensification refers to the deepening of the spatial conditions of inhabitation through physical realization and enhancement of spatial quality, whereas extensification refers to the expansion of inhabitation into collective spatial domains.

The development of architectural discipline through these two modes remains within the boundaries of architecture so long as it remains

oriented toward inhabited space as the formal object and continues to satisfy the minimum ontological threshold previously formulated. Intensification primarily operates within the domain of the Core Architectural Discipline (DIA) and part of the Spectrum of Architectural Disciplines (DSA), particularly in physical realization and enhancement of spatial quality. Extensification, meanwhile, operates within DSA in expanding inhabitation into communal and public scales without altering its ontological orientation.

Within this framework, KEPKA functions to ensure that all processes of intensification and extensification remain epistemically traceable through the relationships among elements, properties, composition, function, experience, and meaning. Through its five levels of analysis (L1–L5), KEPKA positions spatial evidence as the basis of interpretation, such that architectural meaning is never detached from physical structure and inhabitation experience.

In relation to the liminal territory, KEPKA also functions as an epistemic evaluative tool for interdisciplinary contributions. Contributions originating outside architecture, such as artificial intelligence, psychology, or social sciences, may be accepted as part of architecture only if their impacts upon spatial configuration and inhabitation experience can be traced through the KEPKA framework, while continuing to satisfy the minimum ontological threshold formulated within AMSS. Consequently, the liminal territory is not only conceptually determined, but may also be operationally tested.

Through this integration, the structure of architectural boundaries becomes complete and layered, namely: (1) the Ontology of Architecture as the principle of inhabitation; (2) the Core Ontology of Architecture as the minimum condition of inhabited space; (3) AMSS as the minimum ontological threshold; (4) Architectural Discipline (DIA–DSA) as internal development through intensification and extensification; (5) KEPKA as the epistemic mechanism ensuring traceability and validity of architectural claims; and (6) the liminal territory as the evaluative zone for external contributions.

This structure demonstrates that the boundary of architecture lies not only in what belongs or does not belong to architecture, but also in how architecture is understood, tested, verified, and responsibly developed. Accordingly, KEPKA does not merely complement the ontological

structure of architecture, but also ensures that every architectural claim remains spatially traceable, verifiable, and scientifically accountable.

Table 1. Synthesis of architectural boundaries based on the results of the step 1–2–3 analysis

Concept	Primary question	Formal object	Material object	Role	Example	Description
1. Ontology of Architecture (OA)	Why does architecture exist?	Principle of inhabitation	The human body and fundamental needs (orientation, protection, comfort)	Ontological principle	Activities of dwelling, sheltering, and movement	Not a building; this is the level of ontological consciousness. It becomes the foundation for all subsequent layers.
2. Core Ontology of Architecture (OIA)	When does something become architecture?	Protected inhabited space	Floor, walls, roof (minimum enclosure)	Existential minimum	Houses, classrooms, hospital wards, offices, and other building functions	Ontological threshold
3. Core Architectural Discipline (DIA) — Intensification-1	How is space realized?	Inhabited space	Structure, construction, and building systems (columns, beams, foundations, joints)	Physical realization	Concrete, steel, and timber structural systems in buildings	Basic-stage intensification: enabling space to exist concretely
4. Spectrum of Architectural Disciplines (DSA) — Intensification-2 / Extensification	How is space developed and expanded?	Space + experience + collectivity	Internal: lighting, ventilation, acoustics, thermal materials. External: landscape, streets, plazas, spaces between buildings	Enrichment and expansion	Internal: lighting design for worship spaces, ventilation in tropical houses. External: urban plazas, sidewalks, courtyards, kampungs, district-scale urban areas	Intensification (enhancement of spatial quality) + extensification (expansion into collective space). It remains architecture because it affects inhabitation.
5. Liminal Territory	What constitutes the contribution of other disciplines?	Not space itself	Data, algorithms, imagery, perception, language narratives, social and cultural factors, AI	Relational (conditional)	AI generative design, behavioral simulations, environmental psychology studies	May be considered legitimate only if it demonstrably impacts inhabited space. Otherwise, it remains outside architecture.

Significance of the synthesis for architectural knowledge

The synthesis developed in this research carries significance across three principal domains of architectural knowledge.

First, at the ontological level, this study reaffirms that architecture must be understood as a field of knowledge grounded in the principle of human dwelling within spatial configuration. The articulation of Architectural Ontology (OA) as a principle, Core Architectural Ontology (OIA) as

the minimum ontological condition, and AMSS as the minimum ontological threshold provides a clearer conceptual foundation for distinguishing architecture from mere buildings, technical systems, or symbolic representations alone. In this regard, the study contributes to clarifying the essence of architecture, which has frequently become obscured within contemporary discourse that excessively privileges themes, technologies, or methods.

Second, at the disciplinary level, the formulation of the Core Architectural Discipline (DIA) and the Spectrum of Architectural Disciplines (DSA) establishes a systematic framework for understanding how architecture is materialized, developed, and expanded without losing its ontological orientation. This synthesis enables specialization, disciplinary subdivisions, and methodological developments to be understood as legitimate forms of internal enrichment, insofar as they remain oriented toward dwelling. Consequently, this research offers an alternative to the tendency toward disciplinary over-extension, which equates the entire domain of the built environment with architecture itself.

Third, at the epistemic–methodological level, the introduction of the liminal region as a testing zone for interdisciplinary contributions, together with its integration with KEPKA, provides a conceptual mechanism for managing architecture’s openness to other fields of knowledge in a responsible manner. The liminal region allows architecture to remain open to technology, artificial intelligence, and the social sciences without surrendering its disciplinary identity. The contribution of this study lies in providing an orientational structure that researchers, educators, and designers may employ to position their research and practice more clearly within the horizon of architectural knowledge.

Accordingly, the architectural boundary structure formulated in this research does not merely present a layered arrangement, but operates as an integrated operational mechanism.

Within this framework, Architectural Ontology (OA) establishes the principle of dwelling as the foundation, Core Architectural Ontology (OIA) defines the minimum condition for the existence of habitable space, and AMSS functions as the operational threshold that evaluates whether such conditions are genuinely fulfilled within physical–spatial configurations.

Subsequently, the Core Architectural Discipline (DIA) and the Spectrum of Architectural Disciplines (DSA) function to materialize and develop habitable space through two principal modes, namely intensification and extensification, both of which remain within ontological boundaries so long as they satisfy the minimum threshold.

At the same time, KEPKA ensures that these processes can be interpreted, analyzed, and

epistemically validated through the relationships among elements, spatial configurations, experience, and meaning, thereby ensuring that every architectural claim retains traceability and scholarly validity.

Meanwhile, the liminal region functions as a selective mechanism for external contributions, whereby knowledge originating from other disciplines may only be accepted as part of architecture if its impact upon habitable space can be traced and if it continues to satisfy the minimum threshold established through AMSS.

Thus, architecture within this study is formulated as a configuration of habitable space that is ontologically established, evaluated through a minimum structural threshold, materialized and developed disciplinarily, epistemically validated, and selectively negotiated within controlled interdisciplinary relations.

Scope, strengths, and limitations of the formulation

The formulation of architectural boundaries proposed in this research possesses its principal strength in its capacity to preserve the ontological consistency of architecture without closing the possibility for disciplinary development and interdisciplinary contribution. By explicitly distinguishing among Architectural Ontology, Core Architectural Ontology, AMSS as the minimum threshold, the Core and Spectrum of Architectural Disciplines, and the liminal region, this formulation prevents the categorical confusions that have frequently emerged in architectural discourse, particularly the conflation of domains of study, methods, and the essential nature of architectural knowledge itself. The strength of this formulation lies not merely in terminological novelty, but rather in the coherence of its conceptual structure, which remains testable across paradigms.

Moreover, this formulation is not intended to accommodate every design practice that claims itself as architecture, particularly practices operating entirely at the level of image, narrative, or speculation without any relation to habitable space. Another limitation of this formulation lies in its conceptual nature. The study has not yet tested the formulation of architectural boundaries through empirical case studies or direct application within design practice and architectural education curricula. Nevertheless, this limitation simultaneously opens opportunities

for future studies capable of testing, expanding, or critically examining the formulation within concrete contexts. Accordingly, the limits of application established in this research should not be understood as weaknesses, but rather as part of its epistemic consistency.

Conclusions

This research emerges from a contemporary condition characterized by the increasing obscurity of architectural boundaries due to the intensification of interdisciplinary interventions originating from environmental issues, technology, psychology, social sciences, culture, language, and artificial intelligence. Although such tendencies are frequently celebrated as signs of openness and progress, the findings of this study demonstrate that, under certain conditions, interdisciplinary expansion may instead lead to an ontological crisis of architecture. This crisis does not arise from the mere presence of other disciplines themselves, but rather from situations in which external contributions begin to replace architecture's ontological orientation toward habitable space as its formal object.

Beyond external interventions, the crisis of architectural boundaries is also reinforced by internal mechanisms within architectural education and research, particularly through the fragmentation of fields of study that develop relatively autonomously without explicit orientation toward architecture's formal object. Under such conditions, specialization, initially pedagogical and functional in nature, risks weakening the shared orientation toward habitable space as the central focus of architectural knowledge. Consequently, architecture risks shifting into merely a meeting point of various approaches without retaining a clear ontological center. Through conceptual analysis grounded in the thought of Aristotle, Vitruvius, Norberg-Schulz, Hillier, Broadbent, and Salura, this study affirms that architecture cannot be reduced to merely a broad field of inquiry, but must first be understood as an ontological entity rooted in human dwelling within spatial configuration. From this basis, the research formulates that architectural boundaries cannot be adequately understood simply as a general separation between "architecture" and "non-architecture," but must instead be structured

as a layered framework capable of distinguishing more precisely among ontological principles, minimum conditions, disciplinary developments, and interdisciplinary contributions.

The principal outcome of this research is the formulation of a layered architectural boundary consisting of: (1) Architectural Ontology (OA) as the principle of embodied human dwelling within spatial configuration; (2) Core Architectural Ontology (OIA) as the minimum condition of habitable space; (3) AMSS (Minimum Spatial Structure Threshold) as the minimum ontological threshold operationalizing such conditions; (4) the Core Architectural Discipline (DIA) as the mechanism for the physical realization of space; (5) the Spectrum of Architectural Disciplines (DSA) as the management of the enrichment and expansion of dwelling; and (6) the liminal region as a conditional testing zone for external contributions.

This formulation demonstrates that architectural boundaries are neither singular nor fixed, but layered and relational. OA explains the general ontological principle of dwelling, OIA establishes the minimum architectural condition, and AMSS functions as an ontological testing mechanism that verifies whether such minimum conditions are genuinely fulfilled. Upon this foundation, DIA and DSA operate as legitimate domains of internal development, while the liminal region regulates how architecture may remain open to external contributions without losing its ontological identity. Consequently, boundaries do not function as instruments of restriction, but rather as orientational structures that enable architectural development to remain open while continuing to be rooted in habitable space as its formal object.

This research further demonstrates that disciplinary development within architecture proceeds through two principal modes: intensification and extensification. Intensification refers to the deepening of the spatial condition of dwelling through physical realization and improvements in spatial quality, whereas extensification refers to the expansion of dwelling into collective spatial domains. Both modes demonstrate that architectural expansion remains legitimate so long as it does not sever its relation to habitable space. Accordingly, disciplinary expansion is not understood as a departure from ontology, but rather as a consequence of ontology itself.

At the same time, this study emphasizes that such ontological structure remains insufficient without an accompanying mechanism of epistemic validation. Therefore, KEPKA (Epistemic Framework of Architectural Property–Composition) is positioned as a complementary framework that ensures every architectural claim remains traceable, testable, and spatially accountable. If OIA answers the question concerning the minimum condition for the existence of architecture, and AMSS ensures that minimum ontological threshold, then KEPKA explains how architecture is interpreted, analyzed, and validated as architecture. Within this structure, ontology, ontological threshold, and epistemic mechanism do not replace one another, but mutually complement one another.

Theoretically, this research contributes by formulating a clearer relationship among ontology, minimum thresholds, disciplinary development, and interdisciplinarity in architecture as a coherent structure. Disciplinarily and methodologically, this formulation provides an orientational framework for researchers, educators, and designers to position research and design more precisely, ensuring that architecture is not reduced into merely a tool or derivative of other disciplines. The principal contribution of this study lies not in the addition of new terminology alone, but in the construction of a conceptual structure through which architectural boundaries may be understood, tested, and operationalized more consistently.

This research also opens possibilities for future development, including testing through architectural design case studies, evaluation of architectural education curricula, development of analytical rubrics based on OIA–AMSS–KEPKA, and the formulation of research methodologies that remain rooted in architectural ontology. Accordingly, this study affirms that architecture does not lose its relevance because it possesses ontological boundaries; rather, architecture risks weakening precisely when such boundaries are neither recognized, tested, nor established as the central orientation of architectural knowledge.

Furthermore, this research does not merely formulate architectural boundaries as a layered conceptual arrangement, but as a single integrated operational system.

Within this framework, architecture is understood as a configuration of habitable space that: (1) is rooted in the ontological principle of human dwelling (OA); (2) fulfills the minimum

condition as habitable space (OIA); (3) passes the minimum ontological threshold through AMSS; (4) is materialized and developed through disciplinary mechanisms (DIA–DSA) in the forms of intensification and extensification; (5) is interpreted, analyzed, and epistemically validated through KEPKA; and (6) is selectively negotiated in relation to other disciplines through the liminal region.

Within this position, architectural boundaries are no longer understood as static dividing lines, but rather as operational mechanisms that determine whether a claim, approach, or intervention remains within architecture or has shifted into another discipline.

Thus, the principal contribution of this research lies in the construction of a framework that not only defines architecture, but also provides instruments through which architectural development may be tested, verified, and directed consistently within its ontological boundaries.

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